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Sierra Club Bulletin

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TWENTY-FOUR PAGES OF PLATES

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Sierra Club Bulletin

Galloping, convulsive anxiety
among overcrowded lemmings:
a fresh (and whimsical) approach
to any population problem

The Hare and the Haruspex: A Cautionary Tale

By Edward S. Deevey

Fifteen thousand years ago, when some of our more sensible ancestors had retired to paint pictures in caves in the south of France, the Scandinavian peninsula lay buried under a glacier. Even as recently as the seventh millennium B.C., when the arts and vices of civilization were already flourishing in the towns of Mesopotamia, the part of the earth's crust that is now Scandinavia was still depressed by the weight of half a mile of ice. Although the country has been rebounding at a great rate ever since, many Scandinavians remain depressed today. One reason may be that the Ice Age, as any Eskimo knows, is not yet over. The Scandinavian Airlines tourist who comes and goes like a swallow in the opalescent summer rarely glimpses the wintry or Pleistocene side of Nordic character, which accounts for its toughness, but which also results in some of the world's highest rates of alcoholism and suicide.

Perhaps because it was colonized so recently, the land the Norse called *Midgard* has always been treated as such—as middle ground, that is—by some of its inhabitants; as a good place to be *from*, on the way to some

This article was first published in *The Yale Review* for Winter 1960, copyright Yale University Press. It is reprinted here with permission.

such place as *Asgard*, the abode of the gods. Rome, Byzantium, Normandy, and Britain were all chosen in their turn as earthly versions of *Asgard*. For a while, in the later Stone Age, the earliest emigrants could simply retrace their fathers' footsteps back to Europe, for the Danish Sounds were dry then, and dry land in the southern North Sea made Britain a peninsula before Scandinavia became one. By Roman and Viking times, given access to long ships, emigration continued to be almost as easy as it was fashionable. If one looks at a map of the land of the midnight sun and (remembers what happens when the sun goes down), it is easy to picture history as a series of glacial pulsations, or Gothic spurts, extruding adenturous Northmen toward successive seats of power, and milder winters. Nowadays, possibly because the northern weather is improving, the emigrants are less warlike than they used to be, and Visigoths and Vikings have tended to give way to movie actresses and physicists. The last of the great landwasters, Gustavus Adolphus, died more than three hundred years ago. It was only a few years before his time—in 1579 to be exact—that the animal kingdom seems to have caught the idea and carried it on, for that is the first year in which the now-famous lemmings are known to have been on the march.

Biologists, of whom I am one, have been taking a lively interest in lemmings lately. These rat-sized hyperborean field mice were unknown in the ancient world, and even the sagas are strangely silent about them. They really began to draw attention only in Queen Victoria's time, and especially in England, when the notion somehow got about that Plato's Atlantis lay on the Dogger Bank, under the North Sea. The lemmings' efforts to emigrate from Norway were then explained as vain attempts to recover a lost homeland, now occupied by such thoroughly English creatures as the haddock and the sprat. The fact that Swedish lemmings march in the wrong direction, toward the Baltic, tends to undermine this theory, but science has not come up with a better explanation until very recently. Biologists always hesitate to impute human motives to animals, but they are beginning to learn from psychologists, for whom attributing animal motives to humans is part of the day's work. What is now suspected is that the lemmings are driven by some of the same Scandinavian compulsions that drove the Goths. At home, according to this view, they become depressed and irritable during the long, dark winters under the snow. When home becomes intolerable, they emigrate, and their behavior is then described by the old Norse word, *berserk*.

A LEMMING MIGRATION is one of the great eruptions of nature, and its reverberations, like fallout, are of more than local concern. Biologists

like to picture nature in the abstract as a sort of irregular lattice, or Mondrian construction, composed of feeding relations, whose seemingly random placement is actually so tightly organized that every strut depends on all the others. The lemmings' place in this picture is that of a strut more easily fretted than most, because, like other vegetarians that nourish a variety of carnivores, they are more fed upon than feeding. As Caruso's vocal cords, suitably vibrated, could shatter glassware, the whole of animate creation sometimes seems to pulsate with the supply of lemmings.

In normal years they live obscurely, if dangerously, in the mountains of Scandinavia, and on the Arctic tundra generally. Periodically, despite the efficient efforts of their enemies—which include such mainstays of the fur industry as the marten and the white fox—their reproductive prowess gets the upper hand, and the tundra fairly teems with them. At such times, about every four years somewhere in Norway, though any given district is afflicted less frequently, the balance of nature goes entirely awry, and the Mondrian composition seems to degenerate into parody. Sea birds give up fishing and flock far inland to gorge on lemmings, while the more local hawks and owls hatch and feed families that are several times larger than usual. Foxes, on the shores of the Arctic Ocean, have been known to hunt for lemmings fifty miles out on the pack ice. The reindeer, which ordinarily subsist on reindeer moss, acquire a taste for lemmings just as cattle use salt. Eventually, faced with such troubles (but not necessarily *because* of them—I'm coming to that), lemmings are seized with the classic, or rather Gothic, obsession, and millions of them desert the tundra for the lowlands.

The repercussions then begin in earnest. As the clumsy animals attempt to swim the lakes and rivers, the predatory circle widens to include the trout and salmon, which understandably lose interest in dry flies. The forested lowlands, already occupied by other kinds of rodents as well as by farmers and their dogs and cats, are not good lemming country—the winters are too warm, for one thing—but while the lemmings press on as though aware of this, they show no sign of losing their disastrous appe-

tites. When the crops are gone, though seldom before, exorcism by a Latin formula is said to have some slight effect in abating the plague. Finally, the vanguard may actually reach the sea, and, having nowhere else to go, plunge in—sometimes meeting another army trying to come ashore from a nearby island. A steamer, coming up Trondheim Fjord in November 1868, took fifteen minutes to pass through a shoal of them, but they were swimming *across* the fjord, not down it to the sea. The landward part of their wake is a path of destruction, strewn with dead lemmings, and an epidemic focus of lemming fever—which is not something the lemmings *have,* but a kind of tularemia that people get from handling the carcasses. As the Norwegians take up this unenviable chore their thoughts rarely turn to Mondrian or any other artist; the better-read among them may wonder, however, who buried the six hundred members of the Light Brigade.

American lemmings migrate too, but their outbreaks are observed less often because no cities lie in their path. Knowledgeable birdwatchers are kept posted, nevertheless, by invasions of snowy owls, which leave the tundra when the lemming tide has passed its flood, and appear in such unlikely places as Charleston, the Azores, and Yugoslavia. Every four years or so, therefore, the lemmings affect the practice of taxidermy, and the economics of the glass-eye industry, as the handsome but unhappy birds fall trophy to amateur marksmen while vainly quartering the fields of France and New England. Closer to the center of the disturbance, the cities of western Norway see lemmings before they see owls, and they are not unknown as far away from the mountains as Stockholm, though spring fever is reported to be commoner than lemming fever along the Baltic beaches of Sweden. Olso is ordinarily too far south, but was visited in 1862, in 1876, in 1890, and again in 1910. The 1862 migration, coinciding with the Battle of Antietam, may have been the greatest of the century, and one of its episodes was touching, if not prophetic. The Norwegian naturalist Robert Collett saw them, he said, "running up the high granite stairs in the vestibule of the University" (of Oslo). Evidently they were begging to be investigated by professors. The Norwegian savants were busy, however, and scorned the impertinent intrusion. In 1862 the discoverer of the death wish, Sigmund Freud, was a six-year-old boy in far-away Freiburg, and if he ever saw a lemming or shot a snowy owl his biographers have repressed it.

THAT THE lemmings are neurotically sick animals, at least during migration, has not escaped the notice of close, or even of casual, observers. For one thing, they wander abroad in the daytime, as small mammals rarely

Beach at Garapata Creek

The old voice of the ocean, the bird-chatter of little rivers . . .
From different throats intone one language.

The Big Sur Country

PHOTOGRAPHS, PHILIP HYDE

TEXT, FROM THE POEMS OF ROBINSON JEFFERS

I followed the narrow cliffside trail halfway up the mountain
Above the deep river-canyon. There was a little cataract
crossed the path, flinging itself
Over tree roots and rocks, shaking the jeweled fern-fronds,
bright bubbling water
Pure from the mountain . . .

. . . oaktrees thrusting elbows at the wind,
black-oaks smoldering with foliage
And the streaked beauty of white-oak trunks,
and redwood glens . . .

In Palo Colorado Canyon

Sycamore on old Big Sur Road

Sycamore near Big Sur

. . . But chiefly the gulls, the cloud-caligraphers
of windy spirals before a storm,
Cruise north and south over the sea-rocks and over
That bluish enormous opal; very lately these alone,
these and the clouds
And westering lights of heaven . . .

The ocean swelled for a far storm
and beat its boundary,
the ground-swell shook the beds of granite . . .

I said: You yoke the Aleutian seal-rocks
with the lava and coral sowings
that flower the south,
Over your flood the life that sought the sunrise
faces ours that has followed the evening star.
The long migrations meet across you
and it is nothing to you,
you have forgotten us, mother.
You were much younger
when we crawled out of the womb
and lay in the sun's eye on the tideline.

Old garden of grayish and ochre lichen,
How long a time since the brown people
  who have vanished from here
Built fires beside you and nestled by you
Out of the ranging sea-wind?

North from Arroyo de la Cruz
Immature California Gull by Don Bleitz (opposite)

I drew solitude over me, on the lone shore . . .

Garapata Creek Mouth

Bixby Creek Bridge

From here the great shed of the mountain shot in bronze folds,
Seemed humming like bells under the strokes of the sun;
  in the creases the winter stream-beds,
Haired with low oak, but higher between deep ridges
  spiring to redwood, netted the edge of the continent
With many-branching black threads;
  the wall steepened below and went down
To a sea like blue steel breakless to Asia . . .

The extraordinary patience of things!
This beautiful place defaced with a crop of suburban houses—
How beautiful when we first beheld it,
unbroken field of poppy and lupin walled with clean cliffs . . .

At dawn a knot of sea-lions lies off the shore
In the slow swell between the rock and the cliff . . .

Monterey County coast south of Big Sur

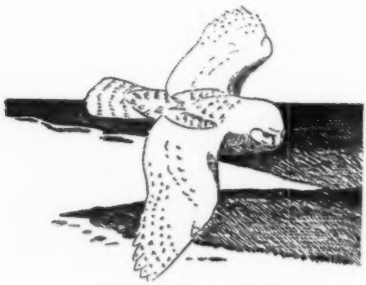
Look—and without imagination, desire nor dream—directly
At the mountains and sea. Are they not beautiful?
These plunging promontories and flame-shaped peaks
Stopping the somber stupendous glory, the storm-fed ocean?

do. For another, when crossed or cornered they show a most unmouselike degree of fight; as Collet said, "they viciously drive their sharp teeth into the foot, or the stick advanced toward them, and allow themselves to be lifted high up by their teeth." Descriptions of the last snarling stages of the march to the sea recall the South Ferry terminal at rush hour, or a hundred-car smashup on a California turnpike. In his authoritative and starkly titled book, *Voles, Mice, and Lemmings,* the English biologist, Charles Elton, summed up "this great cosmic oscillation" as "a rather tragic procession of refugees, with all the obsessed behaviour of the unwanted stranger in a populous land, going blindly on to various deaths." Offhand, however, neurosis does not seem to explain very much of this, any more than shellshock is a cause of war, and, in trying to understand the upheaval, the experts have tended to set the psychopathic symptoms to one side while looking for something more basic.

That something, presumably, would be some property of the lemmings' environment—food, predators, disease, or weather, or perhaps all working together—that periodically relaxes its hold on the mournful numbers. Find the cause of the overcrowding, so the thinking has run, and you will find why the lemmings leave home. But this thinking, though doubtless correct, has been slow to answer the question, because it tends to divert attention from the actors to the scenery. The oldest Norse references to lemmings confuse them with locusts, and the farmer whose fields are devastated can hardly be expected to count the pests' legs and divide by four. More detached students know that mammals do not drop from the sky, but in their own way they too have been misled by the locust analogy, supposing that lemmings swarm, as locusts do, because of something done *to* them by their surroundings. The discovery that the migrations are cyclical, made only a few years ago by Elton, strengthened the assumption that some environmental regularity, probably a weather cycle, must set the tune, to which the lemmings, their predators, and their diseases respond in harmonics. Close listeners to nature's symphony soon reported, however, that it sounded atonal to them, more like Berg's opera *Wozzeck,* say, than like Beethoven's *Sixth.* Cycles of heavenly conjunctions were also looked into, but while the tides are pulled by the sun and moon, and the seasons are undeniably correlated with the zodiac, nothing in astrology reasonably corresponds to a four-year cycle.

The text for the photo section, "The Big Sur Country," is composed of excerpts from the poems of Robinson Jeffers found in these three books: *Roan Stallion; Tamar; and Other Poems* (Boni & Liveright, 1925); *The Women at Point Sur* (Boni & Liveright, 1927); *Hungerfield and Other Poems* (Random House, 1954). Permission to quote from these poems was granted to the *Sierra Club Bulletin* by Mr. Jeffers.

If the lemmings' quadrennial fault lies, not in their stars, but in themselves, it is easy to see why the fact has been missed for so long. One reason, of course, is that most of their homelife takes place under several feet of snow, in uncomfortable regions where even Scandinavians pass little time outdoors. The main trouble has been, though, as a quick review of thirty years' work will show, that the lemmings' path is thickly sown with false clues. Among these the snowy owls and white foxes rank as the reddest of herrings. The idea that the abundance of prey is controlled by the abundance of predators is a piece of folklore that is hard to uproot, because, like other superstitions, it is sometimes true. The farmers and gamekeepers of Norway have acted on it with sublime confidence



for more than a hundred years, backed by a state system of bounty payments, and hawks, foxes, and other predators are now much scarcer there than they are in primeval Westchester County, for example. The result has been that while the grouse-shooting is no better than it used to be, the lemmings (and the field mice in the lowlands, where varmints are persecuted most actively) have continued to fluctuate with unabated vigor. A pile of fox brushes, augmented mainly every fourth year, remains as a monument to a mistaken theory, but their owners may take some gloomy pride in having furnished a splendid mass of statistics.

An even more seductive body of data exists in the account books of the Arctic fur trade, some of which go back to Revolutionary days. They give a remarkable picture of feast or famine, most kinds of skins being listed as thousands of times more plentiful in good years than in lean. Those that belonged to the smaller predators, such as the white fox and the ermine, rise and fall in numbers with the hauntingly familiar four-year rhythm, and the trappers' diaries (which make better reading than the bookkeepers' ledgers) show that their authors placed the blame squarely, or cyclically, on lemmings. Farther south there are periodic surges among

such forest-dwellers as the marten and the red fox, whose fluctuating food supply is field mice. Lynx pelts, known to the trade under various euphemisms for "cat," show a still more beautiful cycle of ten years' length, which certainly matches the abundance of snowshoe hares, the lynxes' principal prey. The ten-year pulse of lynxes was extricated, after a brief but noisy academic scuffle, from the coils of the eleven-year sunspot cycle, and by the mid-'thirties the theory of mammal populations had settled down about like this: the prey begin to increase, and so do their slower-breeding predators; at peak abundance the predators nearly exterminate the prey, and then starve to death, so clearing the way for the prey to start the cycle over again.

The simple elegance of this idea made it enormously appealing, not least to mathematicians, who reduced it to equations and found it to have an astonishing amount of what they call *generality*. In physics, for instance, it is the "theory of coupled oscillations"; as "servomechanism theory" it underlies many triumphs of engineering, such as remote control by radar; in economics, it explains the tendency for the prices of linked products, such as corn and hogs, to chase each other in perpetually balanced imbalance. Regardless of the price of hogs, or furs, however, some killjoys soon declared that the formulae seemed not to apply to rodents. Some populations of snowshoe hares, for example, were found to oscillate on islands where lynxes, or predators of any sort, were scarcer than mathematicians. Besides, the equations require the coupled numbers of predator and prey to rise and fall smoothly, like tides, whereas the normal pattern of mammal cycles is one of gradual crescendo, followed abruptly by a crashing silence. A Russian biologist, G. F. Gause, was therefore led to redesign the theory in more sophisticated form. The predator, he said, need not be a fur-bearing animal; it can be an infectious disease. When the prey is scarce, the chance of infection is small, especially if the prey, or host, has survived an epidemic and is immune. As the hosts become more numerous, the infection spreads faster, or become more virulent, until the ensuing epidemic causes the crash.

In this new, agar-plated guise the theory was not only longer, lower, and more powerful; it was testable without recourse to the fur statistics, the study of which had come to resemble numerology. Made newly aware of lemming fever and tularemia, pathologists shed their white coats for parkas, and took their tubes and sterilizers into the field. The first reports were painfully disappointing: wild rodents, including lemmings, harbored no lack of interesting diseases, but the abundance of microbes had no connection with that of their hosts. Worse, the animals seemed to enjoy their ill health, even when their numbers were greatest,

and when they died there was no sign of an epidemic. Not of infectious disease, anyway; but there was one malady, prevalent among snowshoe hares, that certainly was not infectious, but that just as certainly caused a lot of hares to drop dead, not only in live-traps, but also in the woods when no one was around. Long and occasionally sad experience with laboratory rabbits suggested a name, shock disease, for this benign but fatal ailment, the symptoms of which were reminiscent of apoplexy, or of insulin-shock. The diagnosis, if that is what it was, amounted to saying that the hares were scared to death, not by lynxes (for the bodies hardly ever showed claw-marks), but, presumably, by each other. Having made this unhelpful pronouncement, most of the pathologists went home. The Second World War was on by that time, and for a while no one remembered what Collett had said about the lemmings: "Life quickly leaves them, and they die from the slightest injury . . . It is constantly stated by eyewitnesses, that they can die from their great excitement."

THESE DELPHIC remarks turned out to contain a real clue, which had been concealed in plain sight, like the purloined letter. An inquest on Minnesota snowshoe hares was completed in 1939, and its clinical language describes a grievous affliction. In the plainer words of a later writer,

> This syndrome was characterized primarily by fatty degeneration and atrophy of the liver with a coincident striking decrease in liver glycogen and a hypoglycemia preceding death. Petechial or ecchymotic brain hemorrhages, and congestion and hemorrhage of the adrenals, thyroid, and kidneys were frequent findings in a smaller number of animals. The hares characteristically died in convulsive seizures with suddent onset, running movements, hind-leg extension, retraction of the head and neck, and sudden leaps with clonic seizures upon alighting. Other animals were typically lethargic or comatose.

For connoisseurs of hemorrhages this leaves no doubt that the hares were sick, but it does leave open the question of how they got that way. Well-trained in the school of Pasteur, or perhaps of Paul de Kruif, the investigators had been looking hard for germs, and were slow to take the hint of an atrophied liver, implying that shock might be a social disease, like alcoholism. As such, it could be contagious, like a hair-do, without being infectious. It might, in fact, be contracted in the same way that Chevrolets catch petechial tail fins from Cadillacs, through the virus of galloping, convulsive anxiety. A disorder of this sort, increasing in virulence with the means of mass communication, would be just the coupled oscillator needed to make Gause's theory work. So theatrical an idea had never occurred to Gause, though, and before it could make much progress the shooting outside the windows had to stop. About ten years

later, when the news burst on the world that hares are mad in March, it lacked some of the now-it-can-be-told immediacy of the Smyth Report on atomic energy, but it fitted neatly into the bulky dossier on shock disease that had been quietly accumulating in the meantime.

As a matter of fact, for most of those ten years shock disease was a military secret, as ghastly in some of its implications as the Manhattan Project. Armies are not supposed to react like frightened rabbits, but the simple truth, that civilians in uniform can suffer and die from shock disease, was horrifyingly evident in Korea. As was revealed after the war, hundreds of American captives, live-trapped while away from home and mother, had turned lethargic or comatose, or died in convulsive seizures with sudden onset. Their baffled buddies gave it the unsympathetic name of "give-up-itis."

Military interest in rodents was whipped up long before 1939, of course, but its basis, during more ingenuous ages, was not the rodents' psyches. Rats have fought successfully, if impartially, in most of mankind's wars, but the Second World War was probably the first in which large numbers of rodents were deliberately kept on active duty while others were systematically slaughtered. To explain this curious even-handedness, and at the risk of considerable oversimplification, we may divide military rodents (including rabbits, which are not rodents, but lagomorphs, according to purists) into two platoons, or squadrons. First, there are wild, or Army-type rodents, which not only nibble at stores but carry various diseases; they are executed when captured. Then there are domestic, cabined, or Navy-type rodents; during the war these were mainly watched by Navy psychologists in an effort to understand the military mind. The story of the first kind was superbly told by the late Hans Zinsser in *Rats, Lice, and History*, a runaway best-seller in the years between World Wars. Conceivably as a result, there were no outbreaks of louse-born typhus in the Second World War, but, in the course of their vigil, wildlife men continued to run into pathologists at Army messes around the world. The yarn of the Navy's rats has never been publicized, however (except, obliquely, in such studies of mass anxiety as William H. Whyte's *The Organization Man*).

The kind of nautical problem the psychologists had in mind was not the desertion of sinking ships, but the behavior of men under tension. The crowding of anxious but idle seamen in submarines, for instance, had had some fairly unmartial effects, which needed looking into. As subjects, when mariners were unavailable, the psychologists naturally used rats, which can be frustrated into states of high anxiety that simulate combat neurosis. So now, to recapitulate, there were *three* kinds of rodent experts in the Pacific theatre—zoologists,

pathologists, and psychologists—and when they met, as they often did at the island bases, something was bound to happen. What emerged was a fresh view of rats, with which some of the lonelier islands were infested. These were no ordinary rats, but a special breed, like the Pitcairn Islanders, a sort of stranded landing-party. They were descendants of seagoing ancestors, marooned when the whalers had left; but, as the only wild mammals on the islands, they had reverted to Army type. It was soon noticed that when they entered messhalls and BOQ's they solved intellectual problems with great acumen, along with some anxiety-based bravado. Outdoors, on the other hand, their populations went up and down, and when abundant they terrorized the nesting seabirds or ran in droves through the copra plantations. Often, too, they simply dropped dead of shock. In short, they were rats, but whereas in confinement they behaved like psychologists, when at liberty they acted remarkably like lemmings.

IF ISLANDED feral rats contributed to the lemming problem, biologists could take wry pleasure in the fact, for most of the rats' contributions to insular existence—to the extinction of hundreds of kinds of interesting land birds, for instance—have been a lot less positive. Then, too, a back-to-nature movement led by psychologists promised to be an exhilarating experience, especially if it included an id-hunt through Polynesia. I have to admit, though, that it didn't work out quite that way, and my account of events in the Pacific theatre may be more plausible than accurate. The published facts are scanty, and my own duty as a Navy biologist was spent amid barnacles, not rodents, on the Eastern Sea Frontier. My first-hand knowledge of Pacific islands, in fact, is confined to Catalina, where rats are visible only on very clear days. What I *am* sure of is that startling things were learned in many countries, during the war years, about the capabilities of many kinds of animals besides rats. When these were added up it was not incredible that rodents might suffer the diseases of suburbia; some students would not have been surprised, by then, if bunnies were found to say "boo" to each other in Russian.

Bees, for example, were proved to be able to tell other bees, by means of a patterned dance like a polonaise, the direction and the distance from the hive at which food could be found, as well as the kind of flower to look for and the number of worker-bees needed to do the job. For compass directions they report the azimuth of the sun, but what they perceive is not the sun itself, but the arrangement of polarized light that the sun makes around the sky.

Navigating birds, on the other hand, take bearings on the sun directly,

or on the stars, but when visual cues fail they fall back on an internal chronometer, conceivably their heart-beat, to reach their destination anyway.

Prairie-dogs in their towns pass socially accepted facts, such as the invisible boundaries between their neighborhoods, from one generation to the next; they do it by imitating each other, not by instinct, and European chickadees do the same with their trick, invented about 1940, of following milkmen on their routes and beating housewives to the bottled cream.

Ravens and jackdaws can count up to six or seven, and show that they can form an abstract concept of number by responding, correctly, whether the number is cued by spots on cards, by bells or buzzers, or by different spoken commands.

A Swedish bird called the nutcracker remembers precisely where it buried its nuts in the fall, then digs them up, in late March, say; confidently and without errors through two feet of snow.

For its sexual display, an Australian species called the satin bowerbird not only constructs a bower, or bachelor apartment, decorating it with flowers and *objets d'art*, as do other members of its family, but makes paint out of charcoal or fruit-juice and paints the walls of its bower, using a pledget of chewed bark for a daub.

Bats avoid obstacles in total darkness, and probably catch flying insects too, by uttering short, loud screams and guiding themselves by the echoes; the pitch is much too high for human ears to hear, but some kinds of moths can hear the bats coming and take evasive action.

Made groggy by facts like these, most of them reported between 1946 and 1950, biologists began to feel like the White Queen, who "sometimes managed to believe as many as six impossible things before breakfast." Still, no one had yet spent a winter watching rodents under the snow, and the epicene behavior of bower-birds was not seen, then or since, as having any direct bearing on mammalian neurosis. If anything, the intellectual feats of birds and bees made it harder to understand how rodents could get into such sorry states; one might have credited them with more sense. Until new revelations fom the Navy's rats laid bare their inmost conflicts, the point was arguable, to least, that anxiety is a sort of hothouse bloom, forced in psychologists' laboratories, and could not survive a northern winter.

As a footnote in a recent article makes clear, the United States Navy takes no definite stand on rodents. "The opinions or assertions contained herein," it says (referring to a report on crowded mice), "are the private ones of the writer, and are not to be construed as official or reflecting the views of the Navy Department or naval service at large." This disavowal

is a little surprising, in that its author, John J. Christian, as head of the animal laboratories of the Naval Medical Research Institute at Bethesda, Maryland, can be considered the commander of the Navy's rodents. Ten years ago, though, when he wrote what may be thought of as the Smyth Report on population cycles, his opinions were temporarily freed from protocol. An endocrinologist and Navy lieutenant (j.g.), Christian had left the Fleet and gone back to studying mice at the Wyeth Institute, in Philadelphia. His luminous essay was published where anyone at large could read it, in the August 1950 issue of the *Journal of Mammalogy*, under the title "The Adreno-Pituitary System and Population Cycles in Mammals." In it Christian said, in part:

> We now have a working hypothesis for the die-off terminating a cycle. Exhaustion of the adreno-pituitary system resulting from increased stresses inherent in a high population, especially in winter, plus the late winter demands of the reproductive system, due to increased light or other factors, precipitates population-wide death with the symptoms of adrenal insufficiency and hypoglycemic convulsions.

DEDICATED READERS of the *Journal* remembered the snowshoe hares' congested adrenals, and did not need to be reminded that shock is a glandular disorder. They also knew their scientific Greek, and easily translated *hypoglycemia* as "lack of sugar in the blood"; but what they found new and fascinating was Christian's clinical evidence—much of it reported by a young Viennese internist named Hans Selye—tending to show that rodents might die, of all things, from a surfeit of sexuality. Most people had thought of rabbits as adequately equipped for reproduction, but that is not the point, as Christian developed it: what does them in is not breeding, exactly, but concupiscence. Keyed up by the stresses of crowded existence—he instanced poor and insufficient food, increased exertion, and fighting—animals that have struggled through a tough winter are in no shape to stand the lust that rises like sap in the spring. Their endocrine glands, which make the clashing hormones, burn sugar like a schoolgirl making fudge, and the rodents, not being maple trees, have to borrow sugar from their livers. Cirrhosis lies that way, of course, but death from hypertension usually comes first.

In medical jargon, though the testy author of *Modern English Usage* would protest, the name of this state of endocrine strain is *stress*. As the physical embodiment of a mental state, anxiety, it is worth the respectful attention of all who believe, with mammalogists, that life can be sweet without necessarily caramelizing the liver. Despite its technicality, the subject is uncommonly rewarding. It is not only that seeing a lemming

as a stressed animal goes far toward clearing up a famous mystery. And, although the how and why of psychosomatic ailments in wild rodents are undeniably important to tame men, the problems of gray flannel suits are not my main concern. The real attraction of stress, at least for a biologist, consists simply in the way it works: it turns out to contain a whole array of built-in servomechanisms. That is, the coupled oscillation of hosts and disease, which Gause thought might underlie the fluctuating balance of nature, is mimicked inside the body, and may be said to be controlled, by mutual interaction between the glands. Biologists are impressed by abstract resemblances of this sort, which, after all, are their version of *generality*. In explaining stress by means of some fairly garish metaphors, therefore, I find it soothing to remember that what is called "imagery" in some circles is "model-making" in others.

As it happens, the master himself is no slouch at imagery. Selye's recent book, *The Stress of Life,* is notable, among other things, for its skillful use of the didactic, or Sunday-supplement, analogy. Without plagiarizing his exposition, though, it is possible to speak of vital needs as payable in sugar, for which the liver acts as a bank. Routine withdrawals are smoothly handled by hormones from the pancreas and from the adrenal medulla, which act as paying tellers; but the top-level decisions (such as whether to grow or to reproduce) are reserved for the bank's officers, the adrenal cortex and pituitary glands. Stress, in Selye's view, amounts to an administrative flap among the hormones, and shock results when the management overdraws the bank.

If the banking model is gently dissected, it reveals its first and most important servomechanism: a remarkably bureaucratic hookup between the adrenal cortex, acting as cashier's office, and the pituitary, as board of directors. Injury and infection are common forms of stress, and in directing controlled inflammation to combat them the cortex draws cashier's checks on the liver. If the stress persists, a hormone called cortisone sends a worried message to the pituitary. Preoccupied with the big picture, the pituitary delegates a vice-presidential type, ACTH or adrenocorticotropic hormone, whose role is literally to buck up the adrenal cortex. As students of Parkinson would predict, the cortex, bucked, takes on more personnel, and expands its activities, including that of summoning more ACTH. The viciousness of the impending spiral ought to be obvious, and ordinarily it is; but while withdrawals continue, the amount of sugar in circulation is deceptively constant (the work of another servomechanism), and there is no device, short of autopsy, for taking inventory at the bank. If the pituitary is conned by persisting stress into throwing more support to ACTH, the big deals begin to suffer retrenchment. A cutback of ovarian hormone, for instance, may allow the cortex to treat

a well-started foetus as an inflammation to be healed over. Likewise, the glandular sources of virility and of maternity, though unequally prodigal of sugar, are equally likely to dry up. Leaving hypertension aside (because it involves another commodity, salt, which needn't be gone into just now), the fatal symptom can be hypoglycemia. A tiny extra stress, such as a loud noise (or, as Christian would have it, the sight of a lady rabbit), corresponds to an unannounced visit by the bank examiner: the adrenal medulla is startled into sending a jolt of adrenalin to the muscles, the blood is drained of sugar, and the brain is suddenly starved. This, incidentally, is why shock looks like hyperinsulinism. An overactive pancreas, like a panicky adrenal, resembles an untrustworthy teller with his hand in the till.

HARUSPICY, or divination by inspection of the entrails of domestic animals, is supposed to have been extinct for two thousand years, and no one knows what the Etruscan soothsayers made of a ravaged liver. Selye would snort, no doubt, at being called a modern haruspex, but the omens of public dread are at least as visceral as those of any other calamity, and there are some sound Latin precedents—such as the geese whose gabbling saved Rome—for the view that emotion is communicable to and by animals. More recently, thoughtful veterinarians have begun to notice that neurotic pets tend to have neurotic owners, and a report from the Philadelphia Zoo blames "social pressues," on the rise for the last two decades, for a tenfold increase of arteriosclerosis among the inmates. If Selye seems to be playing down anxiety—the word is not even listed in the index of his book—I can think of two possible reasons, both interesting if not entirely convincing. Anxiety is an ugly word, of course, and using it can easily generate more of it, just as calling a man an insomniac can keep him awake all night; Selye, as a good physician, may well have hesitated to stress it in a popular book about stress. More important, probably, is the fact that Selye, like any internist, begins and ends his work with bodily symptoms, and only grudgingly admits the existence of mind. A curious piece of shoptalk, which he quotes approvingly and in full from a San Francisco medical man (not a psychiatrist), suggests that some of his professional colleagues, like too many novelists, have read Freud without understanding him:

> The dissociation of the ego and the id has many forms. I had an American housewife with dermatomyositis [an inflammation of skin and muscles] [the brackets are Selye's] who had been taught how to play the piano when she was little, and had continued for the entertainment of the children, but didn't get very far. When she started on large doses of ACTH she was suddenly able to

play the most difficult works of Beethoven and Chopin—and the children of the neighbors would gather in the garden to hear her play. Here was a dissociation of the ego and the id that was doing good. But she also became a little psychotic, and so her dosage of ACTH had to be lowered, and with every 10 units of ACTH one sonata disappeared. It all ended up with the same old music poorly performed.

The false note here, of course, is that business about "the dissociation of the ego and the id." Whatever the id may be, it is not considered innately musical, and *my* professional colleagues would count it a triumph to be able to teach it anything, even "Chopsticks." Still, we may take the anecdote as showing *some* kind of mental effect of stress; what the psychologist sees as rather more to the point is the obverse of this: moods and emotions cannot be injected hypodermically, but their cost is paid in sugar, and their action on the cortex is precisely that of ACTH. Christian finds, for instance, that crowding mice in cages enlarges their adrenals, but fortunately, in experiments of this sort, it is not always necessary to kill the animals to learn the answer. A microscopic sample of blood reveals a useful clue to endocrine tension: college students at exam time show a shortage of the same type of white cell that is also scarce in the blood of crowded mice. (The skittish blood cells are called *eosinophils;* I mention this because the word is sure to turn up in detective stories before long.) The fact that tranquillizing drugs do their work by blocking various hormones opens up another line of evidence, as well as a fertile field for quackery. But the surest sign that anxiety is stress—and its most lurid property—is its ability to visit itself on the unborn. The maker of this appalling discovery, William R. Thompson of Wesleyan University, tells us nothing of the sins of his rats' fathers, but his report shows all too clearly that the offspring of frustrated mothers, part of whose pregnancy was spent in problem boxes with no exit, carried the emotional disturbance throughout their own lives. Nestling birds can learn the parents' alarm call while still inside the egg (as the nearly-forgotten author of *Green Mansions* was among the first to notice), but the mammalian uterus is more soundproof, and the only reasonable explanation of Thompson's results is that the aroused maternal hormones perverted the silver cord, and made it a pipeline to a forbidden supply of sugar.

CIRCUMSPECTLY, now, so as to forestall any harumphs from the naval service at large, we may return to Christian's crowded mice. In outward demeanor the ordinary house mouse, *Mus musculus,* is the least military of rodents, but his dissembling is part of the commando tradi-

tion, and he would not have got where he is today without a lot of ruthless infighting. Nowadays house mice spend little time outdoors if they can help it, but in more rustic times they often scourged the countryside, like Marion's men, and the tenth-century Bishop of Bingen (who perished in the Mouse Tower) learned to his cost that country mice can be pushed too far. Recently, at some of our leading universities (Oslo, strange to say, has *still* not been heard from), mouse-watching has proved informative, if not exactly edifying, and I cull a few tidbits from the notes of some shocked colleagues:

The first thing to notice is that the old murine spirit of mass emigration is not yet dead, despite the effeteness of modern urban living. Not long ago an outbreak was observed—provoked, in fact—at the University of Wisconsin, where the scientists had set up a mouse tower, or substitute patch of tundra, in a junkroom in the basement of the zoology building, and set traps (not enough, as it turned out) in the neighboring offices and laboratories. Nothing happened for a while, except that the food—half a pound of it a day—kept disappearing. Then, in Browning's words, "the muttering grew to a grumbling; and the grumbling grew to a mighty rumbling"; and the experiment, though publishable, became unpopular; the room was simply overstuffed with mice, like a sofa in a neglected summer cottage.

Chastened, yet encouraged by this experience, the zoologists fell back on emigration-proof pens, where they could keep tab on the mice. Taking census whenever they cleaned the cages (which was pretty often, at someone's pointed insistence), they noticed that the numbers went up and down, but, as there were no seasons or predators and food was always abundant, the fluctuations made little sense at first. Gradually, though, when one of the observers, Charles Southwick, thought to count the tiffs as well as the mice, the shiny outlines of a servomechanism came into sight: as each wave of numbers crested and broke, the scuffles averaged more than one per mouse-hour, and hardly any young mice survived to the age of weaning. Putting the matter this way lays the blame, unchivalrously, on the mothers, and in fact, as the tension mounted, their nest-building became slovenly and some of them failed to nurse their litters, or even ate them (proper mouse food, remember, was always plentiful). But the males were equally responsible, though for different hormonal reasons. Like chickens with their peck-order, the buck mice were more concerned for status than for posterity, and the endocrine cost of supremacy was sexual impotence. In one of the pens two evenly-matched pretenders played mouse-in-the-manger with the females, and suppressed all reproduction until they died.

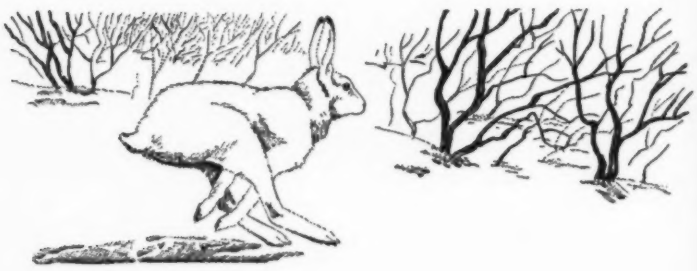
While the Wisconsin mice were either suffering from stress or prac-

ticing a peculiarly savage form of moral restraint, mice at other centers were also made unhappy, or at least infertile, by being given plenty of food, space, and sexual access. It came as no great surprise, then, when the adrenals of Christian's mice were found to swell, as he had predicted eight years before, in proportion to the numbers of their social companions. The really arresting experiment, which dilutes the inhumanity of some of the others, shows that rodents—rats, at any rate—*prefer* to be crowded and anxious. At the National Institutes of Health, in Bethesda, John C. Calhoun allowed litter-mates to grow up in one large pen, where every rat had an individual food hopper. From the start, when eating, they huddled like a farrow at a single hopper; later, though free to roam, eat, and nest in four intercommunicating pens, these rats and their descendants spent most of their time in one of the four, and as I write this they are still there, paying for their sociability in lowered fertility and shortened lives. For his part, my friend Calhoun coined a phrase that deserves to outlive his rats, and is still musing on *pathological togetherness*.

At this point in the argument, explaining the lemmings' periodic dementia should be anticlimactically easy. I seem to have overstated the case, in fact, for it seems less Gothic than *gothick*, like some of the more unnecessary behavior described by the brothers Grimm. The cycle starts where population problems always do, with the lemmings' awesome power of procreation. Nubile at the age of thirty-five days, averaging seven or eight young at a cast, a female lemming may have worries, but barrenness is not one of them, and four litters is par for a summer's dalliance. Lemming life is more austere in winter, but not much. As long as food is plentiful under the snow, the winter sports of pullulation and fighting continue as at a disreputable ski resort. The wonder is—until we remember the owls and foxes above and the weasels *in* the runways—that it takes as long as four years for the numbers to become critical, like the mass of an atomic bomb. When the Thing goes off, then, it is the younger lemmings that emigrate, in search of a patch of tundra that is slightly more private than the beach at Coney Island; though less overtly anxious to begin with, presumably, their state of mind on reaching downtown Olso is another matter entirely. The older, better-established residents, or those with stouter livers, stay home, and die of shock—having first passed on the family disease to the next generation. Before the epidemic of stress has run its course, it spreads to the predators, too (though *this* form of lemming fever is caught, ironically, from *not* eating lemmings). The snowy owl that died at Fayal,

Azores, in 1928 may or may not have known that it had really reached Atlantis, but in being shot by an anxious man it provided a textbook, or postgraduate, example of a coupled oscillation.

If all this is true, and I think it is, the Norse clergymen who exorcized the lemmings in Latin were clearly on the right track, and what the Scandinavians need is a qualified haruspex. Before they hire one, though (I am not a candidate), or resort to spraying the tundra with tranquillizers (which would be expensive), there is one tiny reservation: there is not a scrap of *direct* evidence that the lemming suffers from stress. Come to think of it, no one has yet spent a winter watching lemmings under the snow. (Some California zoologists lived for several winters in Alaska, trying valiantly to do just that, but the runways are pretty small for Californians, and for most of the time there was trouble finding *any* lemmings.) Except for some circumstantial lesions of the skin, which could be psychosomatic, like shingles (and which ruin the lemming's pelt), the case for contagious anxiety therefore rests on a passel of tormented rodents, but not as yet on *Lemmus lemmus*. That animal has baffled a lot of people, and I could be mistaken too. But if I am, or at least if the lemmings' adrenals are not periodically congested, I will eat a small population of them, suitably seasoned with Miltown. Fortunately, lemmings are reported to taste like squirrels, but better; in Lapland, in fact, with men who know rodents best, it's lemmings, two to one.



Editorial

Wilderness River Betrayal

IT WAS JUST three years ago that Charles Eggert's "Forbidden Passage" appeared here. It was illustrated with Philip Hyde's photographs, which are presented once more, and only in part because there are nine thousand more people receiving the *Bulletin* these days.

"A butte rises from the Colorado River's edge," Eggert said, "a great sentinel marking the entrance to Glen Canyon. Here some Indian god must have stood, pointing the way to Paradise. If anywhere, that place was below—through the 147 miles of Glen Canyon. What exquisite and wondrous beauty was there!"

What beauty *is* there, he might have said, but the *was* had a purpose. Most of the beauty would go under once the gates closed in the diversion tunnels at Glen Canyon dam. We now know that the life expectancy of one of America's greatest scenic resources, including the pristine approach to Rainbow Bridge, is reduced to fourteen months. The exact time is not important here. What needs to be chronicled is a flagrant betrayal, unequaled in the conservation history that sixty-eight years of *Sierra Club Bulletins* have recorded.

"If there is weeping to be done," Eggert wrote, "cry over the destruction of this place."

Anyone who knows Glen Canyon unspoiled, or who discovers it in its final year, is to be allowed whatever relief tears may bring. If they are derived from nostalgia, we will be the last to underestimate what may be a deep-down, absolutely essential role in survival itself that is played by nostalgic attraction to the natural world.

If the tears stem from anger, we will know exactly why.

The United States Bureau of Reclamation is destroying Glen Canyon needlessly, and in doing so is violating the promise it gave with a straight face and without which it would never have been permitted to proceed with its superfluous, destructive program. The strangely ingenious way with which the agreement is being broken is in the record. It will anger any man who has time to read the facts.

But there's the rub. Who has time? A huge dam-building bureau, bent on self-perpetuation, can emit plausible-looking statistics and diagrams, can plant articles, and can hold press interviews faster than a true interpretation can overtake them. That is how Glen Canyon dam got through in the first place, in spite of geologists' doubts about design, hydrologists' assurance that the water storage was wasteful, and power engineers' pre-

diction that kilowatts could come cheaper from a longer-lasting resource —the depressed coal industry—than from a short-lived public-power dam on the overengineered, silt-laden, uniquely beautiful Colorado.

The citizens—and the Congress—were very lenient. Too busy to check the facts, and hardly knowing where to go to get anyone to check who did not fear reprisals were his criticism to be publicly attributed to him, they let Glen Canyon dam start. They trusted the Bureau of Reclamation's word, solemnly given and written into law, that the National Park System, including Rainbow Bridge and Echo Park, would not be invaded.

The high price of being naïve is now clear to all, including the co-signers of the Bureau of Reclamation's promissory note: former President Eisenhower, upon advice and assurance of the late Douglas McKay, his first Secretary of the Interior; the United States Senate and House of Representatives, and especially their cognizant committees on Interior and Insular Affairs, who authorized the project and the promise; former Secretary of the Interior Fred A. Seaton, who was honored for saving Rainbow Bridge but was undercut by his own Bureau of Reclamation; and now, Secretary Udall. As a Congressman, Stewart Udall was momentarily persuaded by the Bureau that protection of Rainbow was not feasible; but he subsequently perceived the validity of the conservationist position and argued for funds for protection, only to receive the same treatment accorded Fred Seaton—a powerful Bureau lobbying and inspiring public reaction against its own Secretary.

A Bureau out of hand is now openly espousing a Bridge Canyon dam and Kanab diversion that would put Grand Canyon National Park in a pincers. An attempt has been made to amend the Wilderness Bill to open the way for Echo Park dam. And that's the way the old Park System crumbles.

An earlier Reclamation Commissioner was once taken severely to task in a national magazine as "Our Most Arrogant Bureaucrat." The citizen may now well wonder if bureaus themselves have developed too much momentum, if even their long-term chiefs cannot control them, much less the short-term Secretaries.

Reconsidering Glen Canyon, the citizen needs to "remember these things lost"; he is to be forgiven if he looks back in anger at a shoddy record; and he is to be understood if he asks whether the Bureau of Reclamation has forfeited the right to be trusted further if it can honor neither the law nor its own word.

But the future may not forgive or understand the citizen who, not being able to care less, is silent.

DAVID BROWER

The last days of Glen Canyon . . .

Drifting here, you learned to perceive, not to preconceive, what makes a land beautiful. Beauty is where you see it and you saw it often where the big river, thin-edged with green, slid along under the pastel tapestries. An old river had built the stone grain by grain, and the new river was shaping it—imperceptibly aided by artists who left long ago. You didn't quite catch the river in the act of sculpturing, but the color of the Colorado assured you that creation was still going on.

FOURTEEN PHOTOGRAPHS
BY PHILIP HYDE

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in the side canyons

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Down in the main gorge the vista was fine enough, but what really counted was what you could seek out in a hundred tributary clefts. Georgie White knew when the big boats should be tied up and people should start walking, and you learned to know Warm Springs, the silence of Moki Canyon, and the strangeness of Hole-in-the-Rock.

There were the antiquities that you discovered, and some that would never be.

. . . of somber color

in places the desert sun never knew . . .

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High above the noonday twilight of Hidden Passage you might have looked small but you felt big. For all the massiveness and height, your own good feet could put you there and had. There was time to rest in shady silence, to wonder how, to begin to understand why, once again, to know yourself.

. . . and of the flood-scoured avenue to the Rainbow-

You forgot how far away from the river the great bridge was, once that last turn revealed it to you; and as you walked back down what the flash floods had carved, you were amazed that they had spared so delicate an arch.

ge Creek joined Aztec Creek, and c the Colorado, where a bank er had a home but his progeny not. For the flood will come that not recede and the natural world niss what the ages built here, and alone. Just a few miles below the tion the great dam is building. to put water on land. Not to con- the river. Not to save water in an land. But to divert the force that ted beauty, to generate kilowatt s of electricity instead, while other ces of energy lie idle. For a re- eable commodity we spent this laceable grandeur. Your son may pass close to it. But neither he nor any man yet e born will ever again know it, nor will the intimate things that gave this place its ic ever again know the sun.

—remember these things lost;

and under the vaulting roof of Music Temple
burn a candle to the memory

Forest Encroachment on the Meadows of Yosemite Valley

By Emil F. Ernst

In recent years considerable interest has developed in the history of the meadows of Yosemite Valley, owing in part to belated recognition that forest encroachment is ever present upon open land, the now wide-spread use of fire in the clearing of Sierra Nevada foothill grazing land, and to the study of photographs made many years ago by visitors to the Yosemite Valley. To many, the facts revealed, corroborated by photographic evidence, will come as a surprise. Nature is not static, it is ever changing under the impacts brought about by itself, or by Man, in himself one of Nature's greatest single forces. The history of the meadows and the forests of Yosemite Valley is a shining example of this constant changeableness.

The Yosemite Valley has been called for many, many years, "The Valley Incomparable." Just what is it that entitles it to this appellation? It is not the high waterfalls alone, nor the towering, shining cliffs, the magnificent forests, or the peaceful meadows; for each of these are exceeded in height or in volume, or extent, or beauty elsewhere in the world. The thing that makes the Yosemite Valley "incomparable" is the balancing of all these scenic features in one magnificent and sublime composition.

The question arises, "Has it always been thus, and shall it always be thus?" Nature, constantly changing, answers in the negative. The meadows are one of the two features of the valley which can be radically affected by the efforts of Man or of Nature in a relatively short time. The other feature, the forests, will expand or retreat as the meadows retreat or expand, and they can be considered as a corollary of the meadows. From the geological standpoint, the present or historical state of Yosemite Valley is of little consequence. It is merely a stage that may be either long or short depending upon the viewpoint of the person studying the subject. Man, by his pitifully small activities might, in an infinitesimally small way, either accelerate or impede the speed of the geological processes, but in no way can he elude the final consequences which may be either a flattened plain or a far grander valley.

Yosemite Geology

The critical sequences in the accepted geological history of the development of the Valley began about the middle of the Tertiary period, millions of years ago. Tremendous uplifts and subsequent peneplainations, fol-

lowed by three invasions of ice during the Ice Age, left the valley substantially as it is today. According to François E. Matthes, who made the Yosemite region a life study, the two earlier ice invasions wrought the most extensive and formative results. During the third, or last, ice invasion, the Yosemite Glacier reached only as far as Bridalveil Meadow. In the basin which was scooped out in the rock floor of the valley, a lake was formed which was 5½ miles in length. Other lakes were scooped out in the Little Yosemite and the Tenaya canyons.

The Ice Age ended about 20,000 years ago and since then, according to Dr. Matthes, only a few noteworthy changes have occurred. The lakes in the Little Yosemite and Tenaya canyons were filled in and similar and concurrent geological phenomena resulted in the deeper and larger Yosemite Lake being filled in to give us the present level, park-like valley floor.

History of Yosemite Valley

The recorded history of Yosemite Valley begins with the story of the events leading up to its discovery on March 25, 1851 by the Mariposa Battalion under Major James Savage. It appears that Joseph Reddeford Walker, fur brigade leader for Bonneville, saw the valley in 1833 while on his way to the Central Valley of California. The effective discovery, however, was in 1851. Dr. L. H. Bunnell, a member of the Battalion, wrote a book on the discovery and portions of this book pertaining to the condition of the valley at the time of discovery shall be quoted later.

Unfortunately for history, the near annihilation of the Indian inhabitants of the valley by Paiutes from Mono Lake in 1853 created a void that may never be filled. Knowledge of radical changes which may have occurred previous to the coming of the white man to Yosemite Valley, if any, went to the grave with the slain. A few of the children survived, but their knowledge covered only a pitifully short period before the coming of the white man.

The history of the valley since the arrival of the white man has been well recorded. Dr. Bunnell gave it a good start, and he was immediately followed by an enthusiast, James Mason Hutchings who, through his books and other writings, has left behind a wealth of material. History is further very fortunate in that Carleton E. Watkins, one of the foremost photographers of the West, came early to Yosemite. The changes wrought by the white man in his management and exploitation of the valley had barely begun at the time Watkins made his outstanding photographs. Another photographer to whom we are indebted for early pictures is Charles L. Weed, who was brought into Yosemite Valley by James Hutchings in 1859. Good reproducible prints of Watkins, Weed,

and other early photographers are available, and still others are being brought to light from time to time. These photographs, some of which are reproduced herein, are incontrovertible evidence of conditions existing at the times they were taken, and the interesting story of the white man's occupation of the valley can be unfolded with the aid of these photographs.

Official reports of the various commissions, guardians, custodians, Army officers, scientists, and superintendents are voluminous, and they cover many varied and interesting subjects. Possibly the greatest contribution to recorded history of the early day problems and conditions was the record obtained "In the Matter of the Investigation of the Yosemite Valley Commissioners" which was held early in 1889 in Sacramento. Pertinent statements concerning the meadows given in the testimony of the investigation will be referred to several times in the following paragraphs.

The Meadows of Yosemite Valley at the Time of the Coming of the White Man

Dr. Bunnell, in an article evidently prepared for the *Century Magazine*, and not published, but which was included in the Yosemite Valley Commissioners' Report for the year 1889–90, says that, "The valley at the time of discovery presented the appearance of a well kept park." He goes on further to say, "There was then a little undergrowth in the park-like valley, and half a day's work in lopping off branches along the course enabled us to speed our horses uninterrupted through the groves."

The next reference, in period of time, to the condition of the valley is given by Galen Clark in a letter to the Board of Commissioners of the Yosemite Valley and Mariposa Big Trees Grove, dated August 30, 1894. He says, in part, "My first visit to Yosemite was in the summer of 1855. At that time there was no undergrowth of young trees to obstruct clear open views in any part of the valley from one side of the Merced River across to the base of the opposite wall. The area of clear open meadow ground, with abundance of luxuriant native grasses and flowering plants, was at least four times as large as at the present time."

The next reliable information occurs eleven years later, and refers specifically to conditions at the time when, in 1866, Professor J. D. Whitney, State Geologist, made a careful survey of the bottom of the valley for the Commissioners. The data was plotted on a scale of ten chains (660 feet) to the inch, and it showed the number of acres in each tract of meadow, timber, and fern land. Galen Clark, in his letter of August 30, 1894 to the Commissioners, says that:

In 1866 when Professor J. D. Whitney, State Geologist, made a segregated tabulated map of the floor of the valley, there were seven hundred and fifty acres of meadow ground. Since then the forest growth has so far encroached upon the borders of the meadow land that there is not one-fourth of that amount, and what there is left is becoming so thickly covered with young willows and cottonwoods of four and five years' growth that there are really not fifty acres of clear ground except such as has been under recent cultivation.

H. J. Ostrander, after whom Ostrander Lake and Ostrander Rocks are named, is quoted in the San Francisco *Call* some time in October 1897 as saying of the Yosemite which he had first seen a third of a century previously:

The windings of the beautiful, clear Merced River could be traced for miles up the valley until lost sight of at the base of Cathedral Rocks. At that time in the graceful bends nestled beautiful meadows. Outside of the meadows noble pines, Douglas firs, and cedar dotted the valley. No underbrush, cottonwood nor second-growth pines and fir to obstruct the view of the marvelous walls of the valley.

James M. Hutchings, in his report for 1881 as Guardian, further says:

A dense growth of underbrush, almost from one end of the valley to the other, not only offends the eye and shuts out its magnificent views, but monopolizes and appropriates its best land, to the exclusion of valuable forage plants and wild flowers.

The unwarranted destruction of a tree was unforgivable to him, and the situation must have been serious for him to speak in this vein.

Shortly after the death of George Fiske, well known early photographer of Yosemite, there were turned over to the National Park Service a number of his papers. Included in these papers was an apparently, up to that time, unpublished manuscript by Galen Clark which is presumed to have been written in 1907. In this manuscript, subsequently published in the February 1927 issue of *Yosemite Nature Notes*, Clark says:

A great change has taken place in Yosemite Valley since it was taken from the control of the native Indians who formerly lived there. In the early years, when first visited by white people, three-fourths of the valley was open ground —meadows with grasses waist high and flowering plants. On the dryer parts were scattered forest trees—pines, cedars, and oaks—too widely separated to be called groves of underbrush, leaving clear, open, extensive vision up and down and across the valley from wall to wall on either side. The Indians kept the valley clear of thickets of young trees and brushwood shrubbery, so they could not be waylaid, ambushed, or surprised by enemies from outside, and to not afford hiding places for bears [it should be remembered here that grizzlies then inhabited the valley] or undesirable predatory animals, and also to have clear ground for gathering acorns, which constituted one of their main articles of food. At the present time there is not more than one-fourth of the floor of the valley clear, open ground, as there was fifty years ago. Nearly all

the open ground between the large scattering trees is now covered with a dense growth of young trees, which also extend out over hundreds of acres of the dryest portion of meadow land. Every pine tree of the valley less than seventy-five feet high has grown from seed within the past fifty years.

The written story goes on and on. If the observations and writings of the men quoted can be accepted as shown, then there is no question but that the meadows of Yosemite Valley at the time of, and shortly after, the discovery by the white man, were much larger than they are today. The statements recorded are substantiated fully by photographs that have been taken from time to time beginning with Watkins' great photographs of 1866. The one he took from Glacier Point that year is sufficient evidence in itself that radical changes have occurred in the meadows of Yosemite Valley. Then to strengthen the evidence in Watkins' 1866 series of photographs is another reputed to have been taken in 1870 by an unknown photographer. This photograph must have been taken later than 1870, for improvements known to have been made at later dates appear. However, the changes made by man are clearly shown, and so is the fact that the upper end of the valley was mostly meadow and bereft of the trees that so closely screen it today. After 1870, photographs are more numerous and show the meadows being continually encroached upon by the forest trees.

Some of the more lucid photographs showing the changing character of the Yosemite Valley floor vegetation are found facing page 32. The earlier ones have been re-photographed by Ralph H. Anderson from the points from which they were originally taken. The contrast between the earlier photographs and those of 1943 tell the story far better than mere words.

What Has Been Responsible for the Forest Encroachment?

The question naturally arises that if the Yosemite Valley was an open, brush-free, and park-like valley at the time of the arrival of the white man, why is it today so heavily screened with forest trees? Any one or all of several things may have been responsible for the radical change that has occurred since its discovery by the white man in 1851.

The first thought would be that something has occurred in the character of the meadows themselves. Generally, meadow conditions are primarily dependent upon an abundance of ground water. Perhaps a drying-out is occurring in the Yosemite Valley meadows which permits the more xerophytic trees to gain a foothold which is secured by the further drying-up capabilities of trees exerted upon the lands upon which the foothold has been obtained. The original drying out may have been the result of the lowering of the water table sustaining the meadows of the valley.

The written record contains only one reference to an occurrence which may have affected the water table level of the valley. In 1879 several large boulders were blasted from the Merced River at the lower end of the El Capitan meadows with the objective of hastening the runoff of water from these meadows. However, Hutchings' 1881 report shows that brush and reproduction were already a serious problem only two years after the blasting operations.

Also Nature itself may be responsible for a lowering of the water table. The Merced River is undoubtedly deepening its channel by stream erosion. It is possible that the Merced River forced a major break at one or several points in the stream, which could have the effect of accelerating the runoff of ground water supporting meadow conditions in the valley. As far as the valley is concerned the most likely place for such a break is at the terminal moraine near the foot of Bridalveil Fall. Could this break have occurred concurrently with the arrival of the white man?

Man's Activities—The Indians

There is very little evidence that the Indians used the meadows of Yosemite Valley for any intensive agricultural purposes. They did gather the roots of plants for food, some of the grasses and shrubs for basket making, and more than likely carried on a small amount of what is today called truck gardening. They are reputed to have carried on silvicultural practices on the oaks of Yosemite Valley to enlarge the acorn crop and protect the trees from damage due to excessive weights and accumulation of snow. That the Indians depended very much on roots and grasses of the meadows is indicated in Bunnell's book on the discovery of Yosemite Valley. He tells of placing the captive Chief Tenaya out to graze at the end of a rope after the old chief had lost considerable weight and vigor. The chief foraged around in the meadows for roots, bulbs, and grasses and soon was his old healthy self.

The record indicates that Indians not only all across the continent, but in Yosemite Valley itself, practiced forms of land management conducive to their existence. These were crude compared to those of the white man, but they were effective. Burning was the most common and extensive of these practices. The Indians' objectives in burning were principally to keep down brush wherein their enemies might lurk, to drive game into traps or places where they could be shot down with arrows, to remove the tall grasses covering root crops in the meadows where they grew, and to drive back the encroaching trees on the meadows.

Morton's *New England Canaan* which was published in 1632 and records observations made from 1622 to 1625 has, in part, the following to say:

The savages are accustomed to set fire to the country in all places where they are and to burn it twice a year. . . . The reason that moves them to do this so is because it would otherwise be so overgrown with underweeds. . . .

Another record of the same period is Woods' *New England Prospects* in which he records his observations of 1633 in the words:

. . . there is no underwood, saving in swamps and low grounds . . . for it being the custom of the Indians to burn the woods in November, when the grass is withered and leaves dried, it consumes all of the underwood and rubbish which otherwise would overgrow the country, making it impassable and spoil their much-affected hunting.

Joaquin Miller, in a paper presented to the American Forestry Congress in 1887, said:

It was my fate to spend my boyhood among the Indians. . . . In the spring, after the leaves and grasses had served their time and season in holding back the floods and warming and nourishing the earth, then would the old squaws begin to look about for little dry spots of head land of sunny valley, and as fast as dry spots appeared they would be burned. In this way the Indians always kept their forests open, pure and fruitful and conflagrations were unknown.

Eye-witness accounts of the Indians actually using fire for one purpose or another in the Yosemite Valley are few. H. Willis Baxley in his book *What I Saw on the West Coast of South and North America* published in 1865, records the experiences of his party when it visited the valley in the fall of 1861. Upon their arrival in the Yosemite Valley:

A fire-glow in the distance, and then the wavy line of burning grass, gave notice that the Indians were in the valley clearing the ground, the more readily to obtain their winter supply of acorns and wild sweet potato (huckhau). This unwelcome discovery was soon after confirmed by the barking of dogs, that came echoing from the walls of this grand corridor in startling reverberations.

In his August 30, 1894 letter to the Commissioners, Galen Clark says also:

The Valley had then been exclusively under the care and management of the Indians, probably for many centuries. Their policy of management for their own protection and self-interests, as told by some of the survivors who were boys when the Valley was first visited by whites in 1851, was to annually start fires in the dry season of the year and let them spread over the whole valley to kill young trees just sprouted and keep the forest groves open and clear of all underbrush, so as to have no obscure thickets for a hiding place, or an ambush for any invading hostile foes, and to have clear grounds for hunting and gathering acorns.

When the fires did not thoroughly burn over the moist meadows all the young willows and cottonwoods were pulled by hand.

Speaking of the Miwoks, of which the inhabitants of Yosemite Valley were a branch, Barrett and Gifford, in a bulletin of the Public Museum of Milwaukee, 1933, say:

> The only other control of vegetation which they (the Miwoks) attempted was the burning off of dry brush about August. This was said to have been done to get a better growth the following year. Underbrush was less abundant anciently than now, so informants said, and perhaps was due to periodic burning.

According to Barrett and Gifford the Miwoks used fire for another purpose, and that was hunting. Hunts were staged by the inhabitants of a single community. Fires were set around the meadows which the deer frequented. New fires were built from time to time and the deer approached these fires out of curiosity and were noiselessly shot with arrows by the Indians from their places of ambush.

M. C. Briggs, Secretary of the Commission to Manage Yosemite Valley, in the Report of the Commission to the Governor of California, dated December 18, 1882, makes the following statement:

> While the Indians held possession, the annual fires kept the whole floor of the valley free from underbrush, leaving only the majestic oaks and pines to adorn the most beautiful of parks. In this one respect protection has worked destruction.

During 1881 State Engineer William H. Hall made an exended professional visit to the valley. He submitted a report to the Commissioners dated May 20, 1882, in which he says:

> . . . and the area of meadow is decreasing, while the young thickets of forest or shrub growth are springing up instead. Members of your Board have observed this change; it is very marked, and it may be regarded as in a degree alarming, sufficiently so, at least, to prompt measures calculated to check it.
>
> The cause is alleged to be the abolition of the old practice of burning of the thickets, which practice formerly made new clearings almost every year for grass growth.

Man's Activities—The White Man

The State of California assumed jurisdictior over the Yosemite Valley in 1864 following President Abraham Lincoln's magnificent gift to the State of the "gorge or cleft known as the Yosemite Valley." Although it was reported to the Committee of The Congress handling the bill authorizing this grant that there were no settlers in the valley, this was not in accord with the facts. Attempts at settlement began in 1858 with the construction of permanent living structures. James Lamon became the first all year around resident in the winter of 1862–63, to be followed by James

Mason Hutchings and his family on the 20th of April, 1864. Since then the valley has been in continuous habitation by the white man. A deed dated the 12th of March, 1860, relating to land claims in the valley records the existence of garden spots, fruit trees, and other improvements.

Until recently the Yosemite Valley meadows had been heavily utilized for grazing domestic stock. By 1875 Hutchings had 109 animals employed in the transport of visitors into and around the valley. These animals were grazed on the meadows of the valley. There were other firms engaged in activities which employed animals which were also grazed on these meadows. And until 1892 the slaughtering of animals for meat was an established minor industry; the animals to be slaughtered were grazed on the meadows in the lower end of the valley. In 1921 the elimination of the grazing of dairy herds on the meadows and the removal of considerable stretches of fencing which had nettled the sensibilities of generations of tourists, became a fact long sought. However, one meadow continued to be heavily grazed, and that was the so-called Cook's or Elk Paddock meadow which supported a small herd of Tule Elk introduced from the San Joaquin Valley where these animals formerly roamed in great numbers. The last of the white-man controlled grazing ended in the early CCC days when these elk were removed to open wild range near Lone Pine.

In the early days of occupation by the white man several small areas were given over to farming activities. Hutchings' garden helped to supply fresh vegetables for his hotel, his orchard provided fruits, and an Aaron Harris had a farm in the vicinity of the present Ahwahnee Hotel for a number of years. In fact farming activities were so much in evidence that the November 26th, 1888 edition of the San Francisco *Daily Examiner* likened the valley to a "hay ranch" and published a map showing how practically all of the upper portion of the valley was enclosed in barbed wire. Records exist showing that most of the meadows have been plowed at one time or another mainly to produce hay or for some truck farming.

The grazing, farming, and hay production activities undoubtedly helped to retard the advance of forest encroachment on the meadows, and in this respect the activities of the white man paralleled the crude meadow retaining endeavors of the former Indian inhabitants.

Previous to the assumption of control by the State of California in 1864 there is no evidence that the white man engaged in any extensive or periodic burning of the meadows or of the forest land in Yosemite Valley. Since that time and to the present day, fires have been quickly suppressed and fire prevention measures actively prosecuted. Up until about 1906 this policy of fire suppression was openly and actively condemned by the highest responsible officials who, however, disregarded their own opinions

and carried out the fire suppression and fire prevention policies with which they heartily and honestly disagreed.

These adverse opinions were not confined to the State administrators of the Yosemite Valley, for they can be found in the reports of the Army officer administrators for the areas surrounding the famed valley. Of course the sheep and the cattle men who formerly grazed and burned lands within the present boundaries of the larger national park and elsewhere were vociferous and loud in their denunciations of this policy of not burning and prompt suppression of any fires which happened to start. The aforementioned H. J. Ostrander was a well known cattle man of the early days. Is it not possible that present strict fire prevention and suppression policy has been developed partially in rebellion against the opposition put up by the cattle and sheep men? The recent and increasing use of fire for release of brush-covered lands under the controlled burning programs in the foothills appears to be a recognition of the ages-learned crude land management activities of the Indians.

Comparison of Meadow Areas, 1866 and 1937

Undoubtedly many acquainted with the Sierra Nevada and the subject area, Yosemite Valley, have noticed that no differentiation has been made herein between the dry meadow and the wet meadow. Areas of meadow land, when referred to herein, have these two recognized meadow types lumped together because the records of the past with which we have been dealing, do likewise. There has been little or no apparent loss in area in the true wet meadows where moisture conditions are such that seedlings have little chance to do much more than germinate. The losses in area herein reported have occurred in the dry meadow type of land. The situation is such in the wet meadow areas that catastrophic events would be necessary to alter the growing conditions. Such an event or events, would be of record had they occurred during the period of the white man's experiences in the valley. The dry meadows are, and will continue to be, more susceptible to rapid change through activity by Man or by Nature. It is the dry meadow areas of the Yosemite Valley which the written and the photographic records show as having changed markedly since the coming of the white man.

There exist two surveys which vividly show the decline in size of recognized meadow areas in Yosemite Valley between 1866 and 1937. Fifteen years had already elapsed between the coming of the white man and the first survey which supplies data which can be relied upon. The 1866 survey party headed by State Geologist Whitney found a total of 750 acres of meadow ground. The passage of the previous 15 years may have already measurably affected, through forest encroachment, some of the

meadow area in existence at the time of the discovery of the valley. In 1937 a National Park Service Vegetative Type Mapping party made a map of the ground cover of the same area. A computation of meadow types as shown on this 1937 map revealed a total of 327 acres remaining on the floor of the valley. Between 1866 and 1937 the area of meadow land in the Yosemite Valley had been reduced by 423 acres, or more than 56 per cent of the original 750 acres.

There are thousands upon thousands of wet and dry meadows in the Sierra Nevada. The number of acres lost to forest encroachment in the Yosemite Valley is so small as to make concern over their loss appear ridiculous. But the Yosemite Valley is no ordinary valley. It is outstanding among the very few similar valleys of the world and valleys of this type are called "yosemites." As stated at the outset, that which makes the Yosemite Valley "incomparable" is the blending of the waterfalls, the shining cliffs, the forests, and the meadows into a composition of supreme beauty in Nature. The small area of the meadows which is the leaven of this product of Nature is being progressively weakened as the years pass.

In conformity with the basic policy, the National Park Service has done little or nothing to halt or delay Nature in the encroachment of the forests upon the small meadow areas of the Yosemite. This policy was established by The Congress in the enabling act creating the National Park Service. The policy has made the American national park a living and incontrovertible symbol of the idealistic political philosophy of preserving for the people in their natural state areas of outstanding natural significance.

Unfortunately, however, and it is not intended here to be critical of the close adherence to this policy of retaining in their natural state the national park areas entrusted to the care of the various administrators of the past, the factual record as here presented shows that, as long as 80 years ago, it was evident that protection had worked destruction.

The day of the Indian and his burning is long past. In these days burning is not the tool to use, or to have natural wild fires run unhampered, in order to preserve the remaining meadow areas of the Yosemite Valley. Nor is it practical economically by any other means to attempt to recapture or to entirely stay further forest encroachment.

Fortunately it is now recognized that protection can work destruction. Outstanding scenic views can be preserved from obliteration from forest encroachment through judicious application of vista clearing methods. And in some instances vista clearing could recapture, with relatively small expenditure, now obliterated superb views.

The problem is not unique to Yosemite Valley. What is unique is the fact that we have a written and photographic record covering a period of

more than 100 years of an area which shows profound ecological and esthetic changes.

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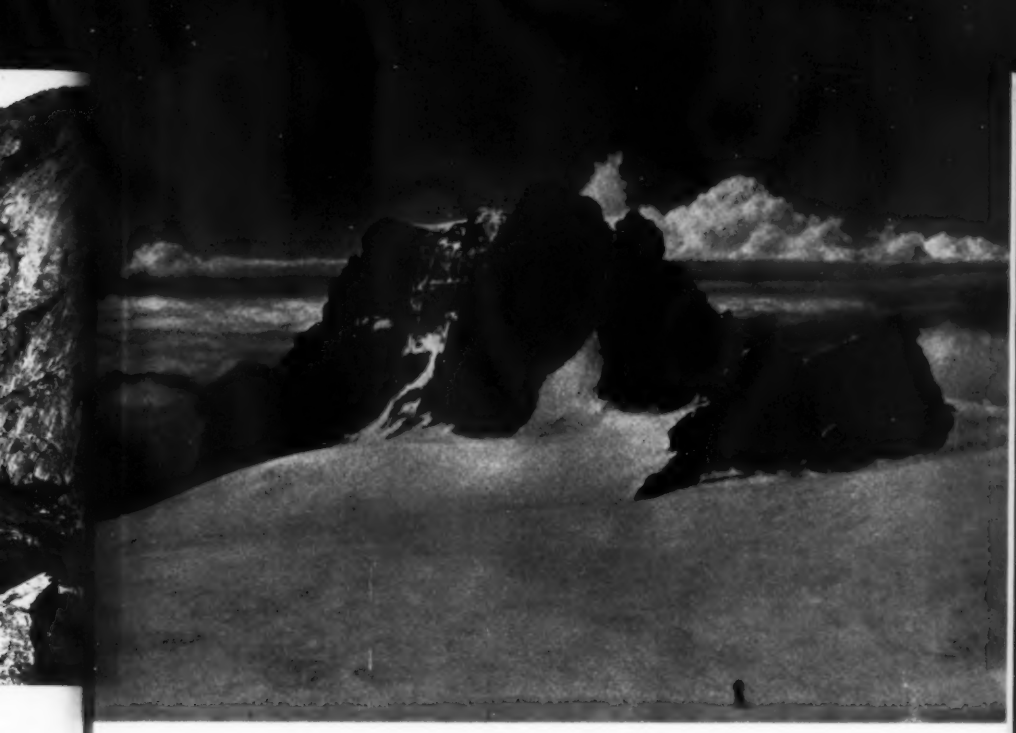
FOREST ENCROACHMENT ON YOSEMITE MEADOWS

These photographs of the upper end of Yosemite Valley, taken from Columbia Point, show the changes that have taken place in the vegetative cover in the 44-year interval between the 1899 Peabody photograph (above) and the 1943 Ralph H. Anderson photograph (below). Note how the meadows have decreased in size, how much more dense the forests are on the valley floor, and how the ground cover has changed from an open grassland type to a cedar-ponderosa pine type.

Protection from fire and grazing has permitted similar changes in the lower end of Yosemite Valley—portrayed above in Watkins' 1866 photograph from Union Point and below in Anderson's 1943 photo from approximately the same spot. The open park-like condition of 1866 with extensive meadows has been replaced in 1943 by dense forest—except for the man-made open meadow-like area in the right center foreground of the Anderson photo.



Looking south from Alexandra toward Savoia, Elena, and Moebius Peaks in the Stanley Group of the Ruwenzori Range. Photograph by A. W. Baxter, Jr.

RUWENZORI—1960

Bakonjo porters assembled at the roadhead. The climbing party of 17 required 73 porters and 4 headmen on the first day to carry 73 loads of 50 pounds each to Nyabitaba. Photograph by Gail Baxter.

Alexandra (left) and Margherita Peaks in the Stanley Group. Margherita, 16,763 feet, was first climbed in 1906 by members of the H. R. H. Luigi di Savoia expedition. Photograph by Michael McMillan.

Mist-covered Bujuku Lake at 13,000 feet in the Ruwenzori Range. Tree heather, giant groundsel and 8-foot lobelia stalks along its muddy shores contribute to the eerie feeling of this dank tarn. Photo by Robert Elliott.

Ascents In the Ruwenzori

By Alfred W. Baxter, Jr., and Douglas Powell

The Ruwenzori range lies on the Uganda–Congo boundary, about 30 degrees east of the Greenwich meridian and north only 20 minutes of arc from the equator. Although small in geographical extent (the major peaks lie in a north-south rectangle barely four by eight miles), the range contains six glaciated mountain groups and more than nineteen summits exceeding 15,000 feet. Margherita Peak, in the Stanley Group, reaches 16,763 feet.

The range is situated along a major branch of the great Rift Valley of Africa, one of the most prominent fracture zones of the earth's crust. Unlike Kilimanjaro and Kenya, Africa's other major mountains, the Ruwenzori is not volcanic but consists predominantly of Pre-Cambrian dark-colored gneisses and schists, usually sound rock for climbing. The range, by reason of its great height above the adjacent lowlands, forms a most efficient condenser upon which the warm, moist air from the surrounding plains is precipitated as mist, rain, or snow. Only during the two solstices, December–January and June–July, are there relatively dry periods. Even then sunshine is restricted primarily to early morning hours. A vital climbing problem in the Ruwenzori is first seeing the peaks and the routes thereon. The glaciers, which seldom descend below 14,000 feet, are small and at present almost stationary, being more like ice-caps crowning summits and high ridges than ice-streams flowing down valleys. Unusual features of the glaciers are the presence of enormous cornices from which hang numerous large stalactites of ice and a conspicuous lack of debris on the ice or silt in the melt-water streams.

The persistently humid climate gives rise below timberline to a dense forest of woody plants, and above timberline to a boggy layer of mosses, liverworts, and lichens extending right to the lower limits of the ice. The vegetation of the Ruwenzori, consisting of many endemic species, is of great botanical and esthetic interest, especially so in the zone from 10,000 feet to the snowline, a grotesque world of moss, bog, rotting vegetation, and gigantic species of heath, groundsel, and lobelia. The upper slopes are not teeming with readily observable animal life, except for the small hyrax, reminiscent of the marmot of western United States;

leopards, however, range up to the snow, and elephants are fairly common below 9,000 feet!

In a well-designed world, the range would form a segment of the Nile-Congo watershed. Actually, waters from the entire range flow into the Albert Nile via the Semliki River, which drains the west side of the range directly and the east side indirectly through lakes George and Edward, which are fed in part by the Mubuku and other east side streams.

Historical Summary[1]

These fabled Mountains of the Moon were cited by Claudius Ptolemy in 150 A.D. and were known to the 14th century Arabian geographer Edrisi. Their existence was confirmed to Western knowledge by Sir Henry Stanley, who saw the snows in May of 1888 during his expedition to relieve Emin Pasha. The range had also been seen by members of Stanley's party a month earlier, and in 1864 by Sir Samuel Baker. Baker, however, did not realize the character or extent of his discovery.

The early history of the range is a series of tentative penetrations from east and west between 1889 and 1906 by such men as Lt. W. G. Stairs, Dr. F. Stuhlmann, the naturalist G. F. Scott-Elliott, C. E. S. Moore, Dr. J. J. David, and a strong mountaineering party of D. W. Freshfield, A. L. Mumm, and the guide Moritz Inderbinnen. In 1906 there was a British Museum Expedition, which included A. F. R. Wollaston, R. E. Dent, and H. B. Woosnam. During this early period, the snow line was reached, the existence of permanent glaciers established, and some minor peaks in the Baker Group ascended. Despite the remarkable efforts of these pioneers, difficult terrain, almost perpetual bad weather, and the intrinsic complexity of the range were sufficient to limit achievement and preserve the topographic secrets of the region.

In the summer of 1906, H. R. H. Luigi di Savoia, Duke of the Abruzzi, visited the range with an expedition of twelve Europeans, including scientists, the photographer Vittorio Sella, and guides Cesar Ollier and Joseph Petigax. After a three-week approach march from Entebbe on Lake Victoria, the Duke's party carried out a program of research, exploration, and photography between June 8 and July 18. The quality and completeness of the expedition's work remain a model of accomplishment to this day. The party ascended nineteen major summits, some of them several times, prepared a remarkably accurate map, and published Sella's magnificent panoramas of the range. Substantial researches were also published on the geology, botany, and fauna of the range.

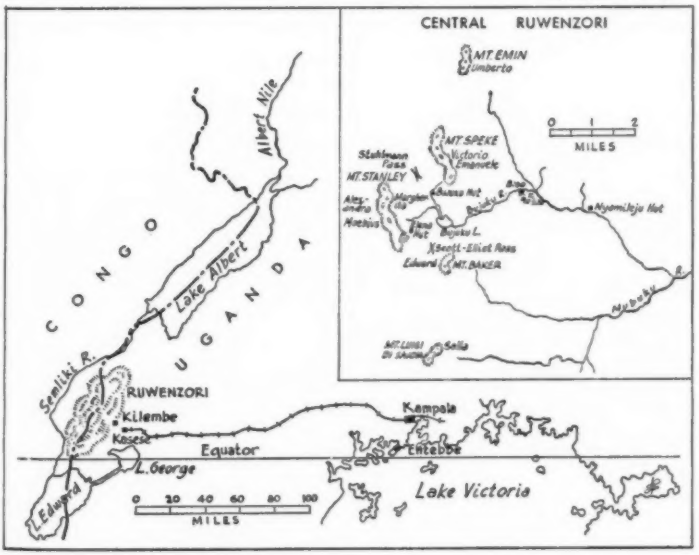
[1] The definitive short work on the history of exploration in the Ruwenzori is "The Exploration of the Ruwenzori" by R. M. Bere, published in the 1951–52 *Alpine Journal*. The summary above is derived in part from this monograph, which is a necessary starting place for any study of the range.—*A.B.* and *D.P.*

In part because of the very thoroughness of the Italian expedition and in part because of the high cost of European expeditions into the range, little climbing was done until 1932. In that year Margherita was ascended for the second, third, and fourth times by Dr. Noel Humphries, by Messrs. Shipton and Tilman, then planters in East Africa, and by a Belgian expedition under Count Xavier de Grunne. In this same year, Dr. Humphries made no less than five visits to the range. With the exception of details of the easterly Portal Peaks (explored by R. M. Bere, Dr. A. J. Haddow, and others, after World War II), the expeditions of 1932 brought to light the last major details of topography.

In keeping with its pre- and post-war status as a vacation ground for climbers from East and South Africa, the range now boasts trails, a native porter corps, and a system of comfortable huts, built largely after 1950 by the Mountain Club of Uganda. While the Ruwenzori is not yet tamed to Alpine standards of docility and convenience, trips into the range are not the heroic enterprises they once were. Convenient air service to Entebbe, comfortable hotels at the Kasese and Fort Portal roadheads, an experienced porter corps, and eight well-located huts provide a core of amenities. As in parts of Canada, however, heroism can begin just off the beaten track or a day away from the nearest hut, where bush and weather remain primeval in their inhospitality.

UGANDA-CONGO BORDER AREA

Maps by John Schagen



Background of the 1960 Expedition

Since 1955 the Sierra Club Outing Committee has sponsored five trips of an expeditionary character in addition to its regular program of summer outings. These five trips[2] should be distinguished from the several mountaineering expeditions organized privately by club members during this period. In sponsoring these trips, the Outing Committee sought to provide an avenue by which competent mountaineers might gain expeditionary experience without assuming the full obligations of organization, logistics, and financial planning. In addition, the Committee regarded these trips as worthwhile in themselves and fully consonant with Committee policy of sponsoring trips of an increasingly diverse character to an increasingly wide range of scenic areas in America and abroad.

Organizationally, these expeditions share the following characteristics:

1. They are relatively expensive; e.g., $330 for St. Elias, $600 for Peru. These costs *exclude* personal equipment and transportation to and from a jumping-off place such as Whitehorse, Vancouver, or Lima.

2. The trips generally require more than the typical two-week vacation; e.g., three weeks for Alaska, four weeks for Ruwenzori.

3. Not all trip applications are or need be accepted if, in the judgment of trip leaders, an applicant has insufficient experience, vigor, or technical ability to profit from a particular trip.

4. The full costs of these trips are shared among the members. Unlike certain major Club outings, where occasional deficits from single trips are made up from general Committee reserves, the expeditionary trips must be individually self-sustaining.

5. A higher proportion of trip membership tends to be drawn from areas and organizations outside of California than is typical of the other outings. The expeditions draw on a national market and welcome occasional Canadian and British climbers.

At its fall meeting in 1959, the Outing Committee authorized preliminary negotiations toward a 1960 expedition to the Central Caucasus in Russian Georgia. At this time, the Ruwenzori Range in Uganda was regarded as a possible alternative objective. By spring of 1960 it became obvious that the Caucasus was not a feasible region for an official Club trip; lengthy correspondence and unofficial ambassadorial work revealed a maze of uncertainties which precluded firm time schedules or accurate estimates of cost. Accordingly, parallel negotiations with Uganda were

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[2] 1955—Coast Range, British Columbia; 1956—St. Elias Range, Alaska-Yukon; 1958—Cordillera Blanca, Peru; 1959—Coast Range, British Columbia; 1960—Ruwenzori, Uganda.

intensified and plans announced for a Ruwenzori Expedition starting and ending in Kampala, Uganda, on July 18 and August 12 of 1960.

The Expedition Under Way

The party assembled in Kampala between July 13 and 18 during a flurry of food and equipment purchases carried out concurrently in Kampala, Nairobi, and the roadhead area. On the afternoon of July 20 the full party, less Powell and Ellena who came in a few days later (after rounding up gear lost or delayed by a whimsical African transportation system), assembled at the Ibanda roadhead, site of a flume intake for the powerhouse serving the Kilembe copper mines. The full journey from Kampala required an overnight train trip to Kasese and a 40-mile truck ride along the east side of the range and up the Mubuku Valley.

Officers of the Mountain Club of Uganda and staff members from the District Commissioner's Office had notified local tribal officials of our pending arrival and of our probable porter requirements. As a consequence, porters, head men, wives, children, and domestic beasts met us at the roadhead in considerable force, some to apply for portering jobs, others merely to enjoy the spectacle. The voluble Bakonjo tribesmen, who speak a Bantu dialect, know little Swahili and less English. Against these linguistic handicaps we finally retained head men and through them the 73 porters required for the first day's march. Because many of the more experienced porters were already in the mountains with other parties, our large requirements placed a heavy burden on local manpower resources and some of our men were of marginal ability.

The six morning hours between dawn and departure on July 21 were loud with labor-management negotiations over loads, rates, fringe benefits, and the issue of blankets and sweaters. Blankets and sweaters are regarded as elements of porter compensation and not as equipment provided for comfort. From this assumption, it follows, in porter logic, that a new blanket and sweater are due upon any departure from the roadhead, be it for one day or three months. It follows further that new blankets and sweaters must be issued to men who have already received same should they be re-employed to carry supplies out of the mountains. Since the blankets and sweaters in question are standardized and of poor quality, many porters leave this equipment with friends or family and depend upon sturdier war surplus clothing for actual mountain travel. It is probable that a substitution of heavier sweaters or blankets would be rejected. Tradition demands slightly undersized sweaters (brightly colored) and cotton blankets (white with red stripe).

Our 73 porters and four headmen were required for our 73 loads of about 50 pounds each. More than 15 of these loads contained porter food,

for each man received 1¾ pounds of cassava flour or corn meal per day in addition to smaller amounts of salt, tea, sugar, dried fish, peanuts, and cigarettes, a total weight of just over three pounds per man per day. The formula of 77 men times three pounds gave us five porter-loads of food to be consumed *the first day*. These five men could, of course, be sent back, as could the four who carried porter food for the second day, etc.

The first day's march is six miles and 3,600 net feet through bamboo groves and rain forest. Stream crossings were easy due to low water. The day ends at the corrugated tin hut and overhanging rock shelters of Nyabitaba, situated at the top of a steep-sided ridge at an altitude of 8,800 feet. A heavy rainstorm at midnight found sahibs, snug in hut and tents, thinking doleful thoughts of sodden weeks to come. The porters, huddled around smoky fires in the caves, continued the spirited discussions begun the moment they had dropped their loads.

A bright clear morning offered spectacular views of the steep-walled Portal Peaks. The vanguard set off by 8 A.M.; the rear guard set off four hours and one porter strike later. Despite powerful oratory from head men and sahibs, thirteen rather than the expected five porters returned to the valley. Some loads were cached at the hut, the remaining necessities being distributed among head men, who thereby suffered a slight loss of status, and sahibs, who merely suffered.

The second day's route leads down 500 feet into the Mubuku Valley, over a crude but welcome suspension bridge, and up six miles and 2,400 feet of difficult but quite passable trail, well-opened by the passage of earlier parties and of our own horde of porters. The rain forest and its mosses were everywhere, obscuring the cliffs and steep talus piles that border the waterfalls of the Mubuku. Just at dark the rear guard reached the cave and metal hut at Nyamileju. With no space for tents, three sahibs had continued to the next intermediate hut; the remaining twelve found minimal bunk and floor space in the hut. Again a midnight deluge, trepidations, but a clear morning.

The sixty porters remaining with us were an elite, and so the entire party got off, sans strike, by 8:30. This third and last day of the approach is a fantastic walk up through a jabberwock forest of 40-foot heather trees, festooned with moss. Then in, over, and around the deep swamps of Bigo, up the Bujuku Valley over the steepest mud many of us had ever seen, and finally, after five miles, over the top of the impressive Bujuku headwall to the muddy shores of Bujuku Lake at 13,000 feet. After a mid-day rest stop amid the tree heather, giant groundsel, and eight-foot lobelia stalks, one of our flower lovers wished that the Millbrook Garden Club could see all this. (So did we.)

(Continued on page 41)

A Carol in Praise of the Hat Monticolous

By Peggy Wayburn

What is a hat? N. Webster said:
"The hat's a cover for the head."
With due respect to Webster, that is
The merest part of what a hat is.

The hat's an emblem of our mores,
Evokes tradition, signals glories.
On top of all, a hat reveals
The secret way its wearer feels.
And so it is that mountain lids
Have much to tell of certain ids:
Both lid and id may run the gamut
With some quite staid, while others ham ut.[1]
And though they're often called ridiculous,
I love the hat (and id) monticolous.

So someone else can write a sonnet
In honor of milady's bonnet,
Or rave about new headgear urban.
I'll sing my song to alpine turban,[2]
To happy hat that gets to shade
Those cheeks that have not felt the blade,[3]
To hats that wear an eagle's plume,[4]
The hair of goat, or primrose bloom,
That ride so well o'er slopes precipitous—
I tip my own to hats monticolous!

I say "hurrah" to neat beret,
To coolie hat, and skimmer gay,
To cowboy hat,[5] fedora nifty
And tam-o-shanter neat and thrifty.
I offer "hi" to broad-brimmed flopper,[6]
A yodel to Tyrolean topper,[7]
A hearty "hey, and a hey-nonny-nonny!"
To knotted kerchief, sun-hat bonny
To helmet pith,[8] to beach hat batty,[9]
And to the bowler small and natty.

[1] See photo section facing page 40.

I take a bow to brim unraveled,[10]
To dashing tilt of hat well-traveled.[11]
A loving pat for hat grown crusty
From dirt kicked up on paths so dusty,
And for that hat that's warm in camp[12]
(The one you sit on when sitting's damp)[13]
The good old hat that won't talk back
When squashed and rolled and stuffed in pack.
Applause for hats with veils delightful
That save the day when bugs are biteful.[14]
Though on a street you'd be conspicuous
On peaks you're peerless, hats monticolous![15]

I'd like to make a nice remark a-
Bout the fur-trimmed hood of parka;[16]
And all those hats that match each other
On father, son,[17] on sister, brother.
And while I'm at it, I would praise
The common hat of uncommon ways:[18]
The swanky Stetson, the good tweed cap,[19]
The visor neat—for each, a clap!

A particular cheer for the mountaineer
And the hat that goes with him year after year,
Taking its drenching and taking its drying,
Faithfully sticking in spots that are trying,
Until, like a feature, its curving brim
Becomes, as it were, a part of him.[20]
(And when you see him sans his hat,
You stop and wonder: "*Who* is that?")
Truly togetherness reaches its zenith
With mountain hat and face that's benith.

Though alpine hats may be expressive
Of traits more often kept recessive,
They have a lilt and spirit of revel
That's seldom found in hats at sea-level.
So let who will choose hats all decorous,
I'll take the charming, mad, disarming, functional, versatile, absurd, glorious, crazy, uproarious, preposterous—hats monticolous.

(1) Ansel Adams

(4) Richard Leonard

Hats Monticolous *

(* See "alpine" in Roget's Thesaurus.)

(2) Lewis Clark

(3) John Muir

(5) The Breed children

(6) Ethel Rose Horsfall

(10) Unknown

(12) Unknown

(8) Bob Lipman

(14) Cedric Wi

orsfall

David Brower

(9) Dary Gibbins

(13) Harvey Broome

) William O. Douglas

(15) High Trip in early 1900's

14) Cedric Wri

(16) The Kehrleins

(17) Two Wayburns

(19) Professor Lawson

(18) Will Colby

(20) Bob Golden

PHOTO CREDITS: 1, 4, 5, 16—Cedric Wright; 2, 6, 8, 14, 18, 19—Ansel Adams; 7—William Hail; 9—Edgar Wayburn; 10—Hal Roth; 11, 13—Robert Phillips, *Life* Magazine; 12—Alfred Schmitz; 17—Peggy Wayburn; 20—Andrew Crofut.

(Continued from page 38)

The Bujuku Lake must be one of the most eerie tarns in the world. Dark muddy beaches are practically overhung by the vegetation-covered cliffs of Mount Baker and the glaciers descending from the unseen Stanley Plateau to the west. Mists circle constantly through the passes, now revealing, now obscuring snow-covered summits. Here was the dank tarn of Auber, below were the ghoul-haunted woodlands of Wier. An hour's sloppy trudge above the lake brought us to a point where the alluvial slopes widen out below Stuhlmann Pass. Here are the two Bujuku huts, at 13,000.

* * * * * *

Each of the four women and thirteen men had come to the Ruwenzori with an individual set of interests, expectations, talents, and experience. Some were appalled by the difficulties of the approach; others astonished at the ease and convenience of the newly hacked trail. So it was to be for the remainder of the trip. Those who had accomplished more difficult climbing found the Ruwenzori peaks rather easy and unexciting from a strictly climbing point of view. Others, with more modest experience, found glaciers, cornices, altitude, and shifting weather challenge enough.

At this point, when the supplies had been sorted and the large body of porters paid off, members of the party teamed up with those of similar taste and interests for short climbs, backpack excursions, extended climbs from the higher huts, or local walks for photography. This flexibility was made possible by the generally high level of mountain-going competence of the trip members, the availability of a few selected porters with experience above base camp, and the plan of the trip to have no single objective except a maximum of climbing and exploration at the higher elevations.

Summary of Ascents

Still missing Powell and Ellena, the party divided forces on July 24, some to climb Mount Speke, the others to sort food and equipment while acclimatizing. For the rest of our stay in the mountains, party members were spread out on climbs, on approaches to huts, at our Bujuku base camp, and on the way out. Good fortune gave us an unparalleled period of good weather. As a result, many members of the party made what seemed to them an adequate number of climbs and then struck out for the roadhead to spread a limited vacation over other interesting parts of East Africa. With the arrival of Powell and Ellena and the departure of small parties, there was almost constant traffic below, through, and above base camp.

A full list of which peaks were climbed by whom is appended at the end of the article. The following paragraphs attempt only to sketch two

typical ascents to indicate the character of the mountaineering involved and the reaction of our heterogeneous group to the climbing requirements.

1. *The Victorio Emanuele Peak of Mount Speke (16,042 feet).* From the Bujuku hut the route leads to the north over a well-defined trail to a point just below the broad Stuhlmann Pass between the Speke and Stanley groups. From here, a belt of steep, moss-covered slabs is ascended. The section is justifiably famous in the literature of the area, for the angle is often high and the moss is affixed to the underlying rock by only the frailest bonds of affection. After an occasional roped pitch on these slabs, the parties had no difficulty ascending the west-facing glaciers which lead to the final rock scrambles below the Emanuele summit. Ropes and crampons were used on the snow. Since the weather generally provided clear views, or at worst intermittent views through fog and clouds, route-finding was not the problem it would be in worse, and more typical, weather. Descent over the slabs was touchy and wearing since even most of the dubious moss holds had been scraped off during the ascent. It should be noted that there are few available alternatives to the proper route through the slabs. Future parties are advised to shun exploration, which could lead to major troubles in bad weather. All members of our party climbed Emanuele Peak, which is generally regarded as the easiest of the Ruwenzori summits, in addition to being directly accessible from the Bujuku hut for a one-day climb.

2. *Margherita Peak of Mount Stanley (16,763 feet).* Although possible in one day from Bujuku, the normal routes on Margherita lead either from the Polish Lake hut (on a shelf 1,800 feet above Bujuku on the east face of Stanley) or, as our climbs were made, from the Elena hut at 14,900 feet on the south side of this group. From this hut one ascends the generally south-facing Elena Glacier to the Stanley Plateau (approximately 16,000 feet); thence slightly down to a point of convenient access to slopes below the east ridge of Margherita, and finally up across the corniced ridge. The point at which the ridge is gained varies widely with snow and cornice conditions and usually offers the point of major technical difficulty. In our case, we climbed the ridge about 500 feet below the summit after steepening snow and a final short but vertical ice pitch. The good weather exposed ample rocks on the northern slopes to make the final climbing free of difficulty or hazard. The time for this climb averaged 7 hours up and back to the hut. The climb from Bujuku to the Elena hut took us about 3 hours, but it could easily be much more in wet weather. Crampons were used above the hut. As we could generally see crevasses on the Elena Glacier and on the plateau, we postponed using the rope until the descent into the crevassed trough between Alexandra and Margherita from whence the Margherita ridge is reached.

Concluding Notes

The Ruwenzori trip confirmed the experience of four earlier Outing Committee expeditions that there is adequate interest in this portion of the Outing Program to justify its continuation. The substantial number

of ascents which were made and the organizational flexibility which permitted people to come to base camp, climb, and return to the flats about as they pleased suggests that it is possible with good luck and good weather to combine mountaineering in distant ranges with more routine tourism and all this within a relatively short three- or four-week vacation. Air travel and trip overhead are part of the costs to be sure; marginal acclimatization and rush tactics are also elements of the bargain.

These expeditions are not trips for highly motivated and highly competent climbers, since the mountaineering is a bit watered down, nor are they suitable trips for those without substantial stamina and general mountaineering experience. But such conditions still leave a large potential market. Interest, leadership, and continuing Outing Committee support are the conditions for tin cups on the Baltoro.

Summary of Party Membership

James Bennett, Bronxville, New York; Stanley Birge, St. Louis, Missouri; Fletcher Dutton, Pebble Beach, California; Nick Ellena, Chico, California; Robert Elliott, San Francisco, California; Lothar Kolbig, Altadena, California; Lia Korner, Salt Lake City, Utah; Michael and Phyllis McMillan, San Francisco, California; Margaret Prouty, Madison, Wisconsin; Jack Tupper, Oakland, California; Ian Michael Wright, New York City, New York; and Christopher and Mary Young, Sharon, Connecticut. *Management:* Douglas Powell, and Alfred and Gail Baxter, all of Berkeley, California.

Summary of Ascents

1. Victorio Emanuele Peak of Mount Speke (16,042), normal route:
   (a) Korner, Bennett, Birge;[3] (b) A. Baxter, P. McMillan, M. McMillan, Kolbig, Prouty, Wright, G. Baxter, Elliott, Tupper; (c) C. Young, M. Young; (d) Powell, Dutton, Ellena.
2. Edward Peak of Mount Baker (15,889), normal route:
   (a) G. Baxter, Elliott; (b) C. Young, M. Young, Zedekia (head man of porters); (c) Powell, M. McMillan.
3. Sella Peak of Luigi di Savoia Group (15,179), north face: G. Baxter, Elliott.
4. Margherita Peak of Mount Stanley (16,763), normal route:
   (a) Korner, Bennett, Dutton; (b) A. Baxter, Kolbig, M. McMillan; (c) A. Baxter, C. Young, M. Young, G. Baxter, Ellena, Elliott.
5. Moebius Peak of Mount Stanley (16,134): A. Baxter, Ellena.
6. Alexandra Peak of Mount Stanley (16,650), south to north traverse:
   A. Baxter, Elliott.
7. Umberto Peak of Mount Emin (15,700):[4] Powell, Elliott.

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[3] Birge was forced to turn back a few hundred feet below the summit for lack of required crampons.

[4] Incomplete ascent to 15,200 feet on the east face, because of dense mist.

Legal loopholes now encourage damage to forest and soil productivity and loss of important redwood parks

The Need to Revise California's Forest Practice Act[1]

By Phillip Berry

In 1945, the people of California, acting through their legislators, decided to let the rule of law govern the conservation of timber on private land within the state. Their purpose was "to conserve and maintain the productivity of the timberlands in the interests of the economic welfare of the State and the continuance of the forest industry; to establish ... standards of forest practice ... adopted to promote the maximum sustained productivity of the forest ... [since] ... the public interest is affected by the management of forests, timberlands, watersheds and soil resources of the State." How to accomplish this salutary goal presented a unique problem in choice of legal methods since more than a few were available, but not all were adequate. The methods hit upon by the Legislature were embodied in the Forest Practice Act, whose policy statement is quoted above. The importance of the Act is demonstrated by the fact that it governs the logging of approximately 80% of the five to six billion board feet of timber produced yearly in California. Examination of the provisions and administration of the Act is worthwhile to determine whether more can be done to fulfill so commendable a purpose.

The Act governs not only the logging of timber, but the reservation of seed sources, prevention of fire, and protection against forest insects and disease. By enactment, the Legislature laid down no specific rules of practice, but delegated its legislative authority to four district committees. These committees may formulate rules of forest practice which meet the operative standard of promoting "the maximum sustained productivity of the forest." The Act defines four forest practice districts which divide the state into four unequal areas and provides for the appointment of members to the respective committees of each. Every member of the committees must represent some specified type of land ownership or industrial status. Four such members are appointed by the Governor, and the fifth is a member of the State Board of Forestry or an employee of the Division of Forestry who votes only in case of a tie.

The rules adopted govern practices on "timberland" and "cutover land" within the district.[2] The rules may be amended by committee and

Board action after public hearings. The most recent amendment under this new procedure for all districts was completed in January, 1961.

The State Forester administers the Act in accordance with the policies of the State Board of Forestry. Administration entails making inspections and taking action to secure compliance with the rules. About half of the inspections made at present are by eight special inspectors and the remainder are made by other personnel from the Division of Forestry. To aid inspection, all landowners on whose land harvesting will take place must give notification of intended operations, and all timber operators must give notice of annual operations and secure a permit which is good until revoked or suspended. Operating without a permit is a misdemeanor.

Enforcement Weapons Are Weak

The State Forester has only two legal weapons to enforce compliance with the rules. He may refuse to issue a permit in certain instances, and he may request his superior, the Director of Natural Resources, to suspend or revoke the permit of a delinquent operator. Except where an applicant is not the real party in interest (where he is not going to be cutting trees anyhow), or where he makes false statements in the application, the State Forester may deny a permit only for conviction within one year of unlawfully operating without a permit. Upon notice of denial, an applicant may request a statement of issues, and unless the State Forester files the statement within thirty days, the permit must be granted. If the statement is filed, the Director of Conservation may order an administrative hearing on the matter, and if the denial is upheld, reapplication may be made after sixty days.

Suspension or revocation of a permit by the Director requires an administrative hearing (as provided for by the California Administrative Code[3]). Essentially, except on the first and second grounds mentioned immediately above for denying a permit, a permit may be revoked only for refusal to allow inspection, refusal to file annual notice of operations, or refusal to comply with the forest practice rules. A proceeding for suspension or revocation may not be commenced without written notice to the permittee stating in what respects he has not complied. An order of suspension or revocation may be appealed to the proper court in accordance with the Administrative Code. Suspension may not exceed one year, after which time the operator may apply for a new permit without prejudice because of his earlier violations.

The joint operation of a section[4] of the Act and a section[5] of the Administrative Code allows the conversion of lands governed by the Act to other than a timber growing use. The only requirement is an affidavit of the owner's bona fide intention to put the land to a different use.

The need for amendment is shown by comparison of the present formu-

lation of the Act with the alternative methods the Legislature could more profitably employ to effectuate the same policy.

Today the Legislature does not put part of the burden of compliance with the rules on the landowner as well as the operator, even where they are the same person. Acceptance of this responsibility could be enforced in several ways through economic sanctions. First, when damage to the land which can be remedied results from logging and the owner does not see to its repair, the job could fall to the state. Payment of the state's expenses would be secured by a lien on the land. Second, the present tax exemption for immature forest trees (see Section 12¾, Article XIII, Constitution) could be conditioned on proof of proper logging of the trees last cut from the same stand. Either method would provide the individual landowner extra incentive to force timber operators to follow proper practices by linking his economic self interest more closely to the conservation interests of the state. Logically and legally there exists no reason why the landowner, who benefits, probably, more than anyone from the practice of good forestry, should not aid in enforcement of the rules. There is little reason to grant a tax exemption for growing timber to a landowner whose interest in sustained productivity is so casual that he fails to require compliance with minimum standards of good forestry.

Oregon, the only state which cuts more timber than California, employs methods similar to the first suggested above to insure adequate restocking of cut-over land.[6] One virtue of the condition on tax exemption method is ease of administration. At present, there exists in each county a three-man board, on which the Board of Forestry is represented, to determine the maturity of specific second-growth stands of timber for taxation purposes. That board, with the aid of inspectors from the Division of Forestry already versed in the requirements of the forest practice rules, could determine whether a particular stand merits exemption. The determination could depend upon a certain level of compliance with the rules when the stand was originally cut. In the occasional case of noncompliance despite the owner's best efforts to insure good practices, the condition could be waived pursuant to comprehensive standards. Likewise, where the timber was removed other than by logging the condition would be inapplicable.

The Act itself gives no explanation for the division, but on reason it is obvious that in dividing the state into four districts the Legislature recognized a need for different practice rules in each. The assumption seems to have been that the problems of conserving, say, redwoods along the coast and Jeffrey Pine east of the Sierra crest, differ widely. Solution of these dissimilar problems therefore requires different rules of practice. Developing four sets of regulations the Legislature apparently felt was

beyond its ken, and decided that committees of lumbermen and timberland owners could supply the expertise necessary to the task.

Rules Fail to Prevent Erosion

By devising uniform rules for each district, however, the committees have run into some of the same problems which the Legislature attempted to avoid by dividing the state into four districts. No district, for example, provides special rules of practice for cutting trees on steep slopes with loose soil. Each district applies only a single standard for how many trees must be left for seed stock and how the logs may be dragged out, although the standard may vary among the districts.* Obviously, rules governing cutting on land where the risk of erosion is high should differ greatly from those where the risk is low. Indeed, the difference might need to be greater than that between the rules for cutting redwoods and Jeffrey Pine.

It is not entirely understandable why the committees have failed to attack this particular problem. The lack of available information about the stability of the various soils within the districts seems to be one logical answer. This information necessary to developing intelligent rules might be available within a reasonable period if the inventory presently being taken under the Soil-Vegetation Survey Program[7] were speeded. The program has been carried on for thirteen years by the state in cooperation with Federal and local agencies and currently surveys half a million acres a year. As of 1958, approximately five and one-half million acres had been mapped, leaving an estimated twenty million acres of privately owned wildlands in California remaining to be covered. At the present rate of survey, the study will not be completed until 1985. Unconscionably small yearly budgets (approximately $111,000 last year) have held back progress of the program. This lack of sufficient funds was cited by the Senate Interim Committee on Forest Practices in its 1959 report. The Committee concluded, "the recommendation . . . that this work be accelerated, if we are to make this highly desirable information available in time to be of maximum value in the realization of the full potential of our natural resources is a valid one."[8]

How information about soil stability might be utilized has been suggested by Professor Paul Zinke of the School of Forestry at the University of California. He recommends that timberland be graded according to "hazard classes." Carrying this suggestion further, a different set of rules for selecting and logging the timber would apply for each hazard class, dependent upon variations of slope, soil conditions, type of tree, and other

* The South Sierra Pine District provides two standards for the number of seed trees which must be left. However, application of either standard depends on whether "west side" or "east side" Sierra trees are being cut. Erosion risks due to steepness of slope or looseness of soil are not taken into account.

factors which in a practical way determine whether the soil will erode unduly and whether second growth will have a chance of survival.

Bull Creek Redwoods Fell Through Forest Practice Act Loophole

Under the provisions of the Act and the Administrative Code allowing the conversion of timberland to nonforest uses, more than 500,000 acres have been converted since 1946, according to Division of Forestry figures.[9] Thus, upon the simple affidavit of the owners stating a "bona fide" intention to put the land to another use, a total area two-thirds the size of either Yosemite National Park or the state of Rhode Island has been logged by clear cutting in the last fifteen years. It is appalling, with what ease timberland may legally be converted regardless of its suitability for the substituted use, and the erosion of the land which might result. Not only has conversion often ruined the land converted, but in several notable instances it has damaged both adjoining property and property lower on the same watershed. For example, rapid conversion of too much of the land upstream contributed to the disaster of the Bull Creek Redwoods State Park during the winter of 1959–1960. (See January 1960 and April-May 1960 *SCB*.) Extensive clear cutting of timber and brush clearing by fire was followed by ordinary rains. (It should be noted that following the much heavier rains in 1955 no such damage occurred.) A flash flood resulted which tore away the soil supporting some of the world's largest trees. When a number of these giants fell, conservationists asked, "Where was the Forest Practice Act?" The Act was there—with a loophole big enough to lose a state park through.

Long before the calamity at Bull Creek, reports of the Division of Forestry alluded to the problem posed by this obvious defect in the Act. The 1956 Forest Practice Act report noted at page 4, "There is some feeling that people who do not wish to observe the Forest Practice Rules have found it convenient to utilize certain exemptions provided [by this loophole] to escape compliance with the rules without carrying out the intent of devoting the land to other than timber growing use." Presumably the Division suggested possible methods of closing this loophole before the Act was amended in 1957, but the problem was not remedied.

One solution to the problem would follow Professor Zinke's suggestion of grading lands according to hazard classes. In classes where the risk of erosion is high, or where the owner's alternative use for the land is not its highest and best use, conversion of the land would be disallowed. In principle, classifying land by hazard classes and regulating its use accordingly is like zoning land within metropolitan areas. Both systems follow the utilitarian principle of getting the most from the land over a

long period of time. Short of applying the principle of utility, at least steps should be taken immediately to plug the loophole which presently allows upstream owners to destroy state parks with impunity.

Although the Act is intended to be effective, there have never been enough funds for adequate inspection of lumbering operations. According to the Forest Practice Act reports from 1952 to 1958 (publication of the reports was discontinued after 1958 for lack of staff), on the average about 3,000 inspections were made yearly on from 1,560 to 2,100 operations requiring inspection under the Act. These figures are necessarily a bit unclear because the yearly reports employ inconsistent ways of computing the totals. Since repeat inspections comprise, on the average, 45 per cent of all inspections, it is fair to say that at least half the timber operations in California are inspected only once a year. The rest are inspected an average of twice a year.

How well the rules are being complied with is difficult to determine by such infrequent inspections. In 1958, infractions of the Forest Practice Rules averaged one in every two inspections, and the Division estimated that about 37 per cent of the operators were in full compliance with the rules. The degree of noncompliance of the other 63 per cent was not determined. That year's report stated that future reports would analyze the degree of noncompliance; since then no reports have been published. In 1959, Mr. Tobe Arvola, Deputy State Forester in charge of forest management, was quoted as saying, "the degree of . . . compliance with the Forest Practice Rules naturally varies considerably . . . [Some] operators far exceed the state requirements, yet [the operations of] many fall short of meeting minimum standards established by law."[10]

Bringing the delinquent operations into line obviously will require inspections more than once or twice a year. Even with the help of other personnel within the Division, eight inspectors cannot police the entire state of California. Why haven't funds for employing additional inspectors been provided? The Division explains that, "We have not requested additional funds for inspectors feeling that more stress on enforcement was necessary before intensifying inspections. Effective and prompt enforcement will promote better compliance before more inspection would. We have asked for a modest increase in headquarters staff assistance, but have not been completely successful." It would seem that inspection and enforcement complement one another; and one would think compliance with the Act could be promoted best by improving both. According to a circular of the California State Personnel Board, released a year and a half ago, adding one inspector (assistant forest technician) would cost the state from $5500–$7350 per year depending on grade and length of experience. What one inspector would save future generations

of Californians by his conservation effort unfortunately cannot easily be evaluated in economic terms.

The thought that the Act is not designed to be effective must haunt the State Forester since enforcement aids are so palpably inadequate. As noted above, a permit may be suspended only after a proceeding under the Administrative Code, which the Division itself characterizes as "a very slow process (requiring) considerable effort on the part of Division of Forestry personnel as well as carefully coördinated effort on the part of several state departments."[11] All this procedural bother would hardly seem worthwhile when the suspension can last only a year. The State Forester might want to deny permits to habitually delinquent operators, but, as noted before, his opportunities to do so are greatly restricted. Essentially, denial is possible only after the operator has been convicted within the preceding year of operating without a permit.

On request, the Division noted it would require much research to provide figures showing how many permits have been denied recently, but the figure could not be large because the prosecution of suits for operating without a permit has been lax. Division of Forestry figures for the years 1956 through 1958 show an average of 316 operators a year without permits. Yet for all three years combined, a total of 36 complaints was filed for all statutory violations under the Act and related laws. As near as the Division can determine, only about half of the 36 total complaints filed were for operation without a permit. Just why so few were prosecuted—out of 948 discovered instances of operation without a permit—remains unexplained in the Forest Practice Act reports published to date. Several possibilities exist: that some violations were handled by administrative enforcement; that other violations were not referred to the appropriate district attorney; and that the district attorney exercised his discretion not to prosecute some cases which reached him.

Penalties: "As Farthings to Prince"

For the unlucky 18 or so who were prosecuted the law held no dark horrors. The maximum penalty they might have incurred is imprisonment in the county jail for six months and a fine of $500. As one timber owner told the Senate Interim Committee on Forest Practice in 1959, penalties for violating the regulations "are as farthings to the Prince."[12]

There are several ways to strengthen enforcement against delinquent operators: (1) While constitutional considerations might foreclose any chances of shortening the proceedings under the Administrative Code for suspending or denying a permit, certainly the period for which either sanction operates can properly be lengthened. (2) Some of the arbitrary limitations on the State Forester's power might be eliminated. Proceed-

ings for suspending a permit need not be brought by the Director of Conservation but could be brought by the State Forester himself. (3) Making a violation of the rules a misdemeanor rather than mere grounds for suspending a permit would greatly improve the coöperativeness of delinquent operators. In addition, it would eliminate the "very slow process" now involved in litigating suits under the Administrative Code. (4) The violator of the practice rules could be forced to pay for remedying the damage done. Payment could be secured by placing a lien either on his property (logging equipment, sawmills, etc.), as the state of Oregon does, or on the logs taken from the area where the violation occurred. (5) The penalty for operating without a permit could be increased.

Conclusion

In scope, the Forest Practice Act goes far beyond any forest conservation law in other large timber-producing states, and the lead of the California Legislature in this field deserves recognition. However, the methods chosen to effectuate the commendable purpose of the Act have been manifestly inadequate in most respects. It is no answer that amendment was made in 1957. Essentially, that amendment did nothing more than impose the notice requirement for prospective operations and grant the State Forester the discretion to deny permits—a power which in most instances cannot be exercised. The suggestions made here are not intended as a definitive list of solutions to the defects of the Act. However, they demonstrate that the Act must provide more control if it is ever to be more than a pleasant statement of policy.

REFERENCES

[1] Division 4, Chapter 10, Public Resources Code.

[2] The rules become part of the California Administrative Code Title 14, Division 2, Chapter 2.

[3] Pursuant to Chapter 5 (commencing at section 11500, Part 1, Division 3, Title 2 of the Government Code).

[4] Section 4947, California State Forest Practice Act.

[5] Section 1100, Subchapter 4.1, Chapter 2, Division 2, Title 14, California Administrative Code.

[6] See Oregon Revised Stat., Title 44, Chapter 527.160–527.190.

[7] Authorized by Section 4445, Public Resources Code.

[8] Page 44, Joint Report, Senate Interim Committee on Forest Practices.

[9] See page 4 of 1956 Forest Practice Reports (372,402 acres), and add from later FPA reports the following: 1957—68,973 acres; 1958—44,110 acres. (1959 and 1960 figures are unavailable.)

[10] Page 30, Senate Interim Committee on Forest Practices, 1959.

[11] Page 2, 1953 Forest Practices Report.

[12] op. cit. #10, page 38.

Mountaineering Notes

Edited by CARL WEISNER

MOUNT McARTHUR (YUKON TERRITORY)

To reach Mount McArthur requires a walk of nearly 100 miles no matter from what direction one starts. In 1953 a party attempted the peak after walking from Yakutat Bay across the Malespina, Seward, and Hubbard Glaciers. Due to bad weather as well as an appendicitis case they failed to reach the summit. In June of 1961 a group from Seattle solved the walk-in problem by being flown both to and from the base of the North Ridge, but they too failed, presumably because of the weather.

We chose to walk in largely because shoe leather costs less than aviation gas. Also we preferred the route that leads from the Alaska Highway up the Kaskawulsh Glacier and then across the Hubbard to the Logan Glacier and the base of the North Ridge. On Thursday, July 20, we carried out airdrops at the snow line on the Kaskawulsh, at Dr. Walter Wood's glaciological station and at the base of the peak. In five days we walked up Slim's River and the West Arm of the Kaskawulsh to Dr. Wood's camp at 8,700 feet. After two and one-half more days of blazing sunshine on the Hubbard we reached the airdrop at the base of the North Ridge. The five of us, Barbara Lilley, Alex McDermott, Sy Ossofsky, Don Monk, and I had about ten days' food available for climbing the 7,000-foot ridge and summit cone. In three days we established two camps on the ridge at altitudes of 9,500 and 11,000 feet. The route was on snow and ice all the way and involved one fixed rope for rappelling and pack hauling.

The remaining 3,400 feet was too much for a single day without a prepared route, so the next two days were spent in limited efforts on the upper part of the ridge. First Sy, Mac, and Bobbie cut and kicked steps up to the base of the rock step which marks the junction of the ridge with the upper plateau at about 12,300 feet. On the steepest slope they left a 500-foot fixed rope to ease further efforts. Next day Don and I moved rapidly up their route. Don surmounted the critical rock step in a 45-minute lead using two pitons for safety. It was snowing hard so we fixed a rappel rope and returned to camp II.

All was now ready for the final effort and at 3:30 A.M. on August 2 we set out. Increasing wind and drift made it apparent that we had chosen the wrong day and an hour later we were back in the tents. The next day was also cloudy and windy. By now we were getting close to the safety limit on food at camp II so we decided to make an attempt on August 4 even if the weather were doubtful. We were away at 4:00 A.M. and by 6:30 all were over the rock step. The next 1,000 feet was gained on the gentle snow plateau which was fortunately windpacked and allowed rapid progress. This left the final 800-foot summit cone which Sy led on steep ice, snow, and rock. One ice and one rock piton were used for safety. We reached the summit at about 11:00 A.M. and had little view through the wind-blown fog. In fact, we had been in the clouds for the last 2,000 feet and had only occasional glimpses of the route ahead or the glacier 7,000 feet below. The temperature was a relatively warm 22°.

The return to camp was aided by four rappels and we were back by 3:00 P.M. On the next day the weather was again threatening, so we rapidly packed up and were down at base by noon. In blowing snow we crossed the windy Logan Glacier

to a protected camp on its northeast side. That was our last stormy day. We found a usable pass between the Logan and Hubbard Glaciers and it took only another day and a half to reach Dr. Wood's camp. The hospitality of Dr. Wood and his associates could not have been exceeded. Their snow tractors provided four miles of free rides for us and our packs, and in three and one-half days we walked out to the highway at Slim's River Bridge.

GEORGE WALLERSTEIN

NEW CLIMBS IN THE GRAND TETONS

In August, 1960, Joe Fitschen and I did our first climbing in Wyoming's famous Grand Teton National Park. We found the climbing very enjoyable and the country very beautiful.

We made a first ascent on the North Face of Middle Teton, which we named the "North Face Direct." The North Face of Middle Teton is split by a black chimney separating two smooth facets of the face. The route we established goes up the face to the right of this chimney, which is also a watercourse. From the glacier, easy ledges and cracks lead to a headwall where one long pitch of easy sixth class leads to a continuously difficult fifth-class pitch. Above this headwall the angle lessens and easy snow and rock climbing lead to the summit.

The other first ascent we made was the overhanging face of a prominent cliff standing on the left side of the entrance to Garnet Canyon. Though only 300 feet high, this overhang has a sixth-class pitch, the technical difficulty of which is matched only by a few direct-aid problems in Yosemite. Joe and I considered it among the hardest sixth-class pitches we had ever done. We named this cliff "The Big Bluff."

With Yvon Chouinard, Joe and I also made the second ascent of the Northwest Chimney of the Grand Teton. This was a new route established earlier the same summer by Leigh and Irene Ortenberger and Dave Dornan. By straining, we managed to do to the entire climb without using direct-aid. The party which made the first ascent and Yvon, all of whom have had considerable experience climbing in the Tetons, consider this to be the most difficult "alpine" climb in the park.

Jane Taylor and I made a number of interesting and enjoyable ascents in these famous mountains. Among these were the North Face of Grand Teton and the North Face of Teepe's Pillar. The latter route was first climbed several years ago by Yvon Chouinard and Ken Weeks and is technically one of the most difficult routes in the park. It is similar to, but somewhat more difficult than the Arrowhead arête in Yosemite.

Teepe's Pillar also has a northeast face which had not yet been climbed and on August 24, Miss Taylor and I, after ten hours of climbing, made the first ascent of this steep wall. The climbing was mostly sixth class, sometimes difficult. Thirty-nine pitons were placed.

On August 26, we established another new route on the north face of Middle Teton. Leaving our base camp in the upper meadows of Garnet Canyon at 6:10 A.M., we were at the top of the Middle Teton Glacier at 8:45 A.M. The first three pitches were not difficult and followed a ledge running steeply upward to the right across the face. The next four pitches involved sixth-class overhangs and the eighth pitch contained mixed fifth- and sixth-class climbing. Two fifth-class pitches followed, the first involving a maximum fifth-class chimney which was overhanging and wet from snow melting above. After the tenth roped pitch and scrambling, a short rappel led us to the Dike Route which we followed to the summit.

Difficulties that day were increased by cold weather, which numbed the fingers and chilled enthusiasm. All during the morning we were treated to the sight of a

remarkable mountain phenomenon. A wind blew strongly from the west and as it passed the Grand, a dense cloud was created which extended for a mile to the east and enveloped the entire east side of the mountain. This phenomenon was complicated by updrafts which would form clouds at an amazing rate of speed and suddenly cease, leaving the vertically formed clouds to dissipate. Strangely, none of the other peaks we could see were similarly affected.

We reached the summit at 9:20 P.M. and started down the southeast side of the mountain. We later learned that this was not the best way off the mountain. Descending with the aid of the full moon, we wandered down the face, making several rappels at steep sections. This brought us to a seemingly interminable couloir down which we groped our way slowly and carefully. At 12:30 A.M. we reached our camp, thoroughly fatigued, but satisfied. The round trip had taken more than eighteen hours.

In difficulty, the route is judged to be somewhere between the east buttress of El Capitan and the north wall of Sentinel Rock in Yosemite. Sixty-one pitons were placed.

ROYAL ROBBINS

DIRECT NORTH FACE OF MOUNT CLARK

In September 1958, Herb Swedlund, Hobey DeStaebler, Tom Frost, and I climbed the direct north face of Mount Clark. The climb started from the cirque just to the north of the face. Even in September there was a large ice field under the face. Not having axe or crampons, we were forced to hack a number of steps in the ice with a piton hammer and use a large angle piton driven in the ice for protection. This route started above the ice somewhat to the left of the summit and continued up until a narrow ledge was gained that allowed a traverse to the right directly under the face. The route then proceeded directly upward two pitches on fourth-class rock under the right-hand member of a pair of vertical chimneys. The lead up this chimney, approximately grade 5.6, was succeeded by a second of grade about 5.4 which ended on the northwest ridge. This was followed by a third-class ascent to the summit. The climb required about half a day from a camp northwest of the cirque.

HENRY KENDALL

YOSEMITE VALLEY

THE SOUTH FACE OF MOUNT BRODERICK

In these days of extensive climbing in Yosemite Valley, the number of major rock entities without at least one fifth-class route is growing smaller and smaller. So it was that Chuck Pratt's attention was called to Mount Broderick. On May 28, 1960, Chuck, Bob Kamps and I packed into Little Yosemite Valley to have a close look at the south face of the dome with intentions of climbing it on the 29th. The route was quite apparent. The top half of the dome is marked by a large dihedral and below a series of cracks lead up to a ledge which divides the face.

On the 29th, we worked our way amidst brush and over ledges towards the large tree-covered ledge which marks the beginning of the climb. We encountered a pitch that had to be done fifth class, a forewarning that things were going to be a little harder than we had anticipated. Our approach led us up the gully between Mount Broderick and Liberty Cap, then off to the left in order to circumnavigate a large wall directly below the route. It may be possible to avoid the fifth-class pitch, but our inspection of the area from all sides indicated otherwise.

Once at the beginning of the actual climb our situation appeared favorable. The angle of the first half doesn't exceed seventy-five degrees and the cracks looked good. Bob led off and found the first pitch to be mostly challenging sixth class. Chuck then took the lead and his prize was 150 feet of fifth class. From the end of this pitch, a short fourth-class pitch brought us to the halfway ledge. At this point disconcertion set in. The dihedral above was nearly vertical with a fair-sized overhang halfway up. I took the lead off the ledge and worked my way free up a shallow chimney for thirty feet. At this point I ran out of chimney but found a crack that could be nailed. Six dubious pitons brought me to the Hanging Gardens of Broderick. There is a 60-foot vertical jungle on which I moved upward using exclusively vegetable holds for the entire distance. At the top, a short traverse brought me to a ledge large enough to stand and belay on.

The next lead was Chuck's and a good one it was. We were now in the dihedral proper and the angle was too steep to use jam technique. Moderate sixth class brought Chuck to the "Overhangs of Happiness." The first was overcome by placing a knifeblade piton behind a slightly thicker flake. From here a long stretch enabled him to reach a crack which led directly to the large overhang. The placement of pitons in this crack was quite difficult, but upon reaching the overhang the situation got worse. After trying many worthless combinations, Chuck finally discovered a hidden crack inside of the main crack. Using the side of his hammer he established a piton which enabled him to attain the interior of the crack above the overhang which soon widened into a chimney. The crux pitch completed, I led the final pitch, an easy chimney for 90 feet, then onto the face for a bit and five feet of sixth class to the top.

JOE FITSCHEN

EAST BUTTRESS OF EL CAPITAN

Bill Pope and I climbed the east buttress of El Capitan by a new sixth-class route in March, 1961. From the summit of El Capitan, a broad diagonal ledge drops to the east becoming narrower and finally pinching out above the last of the vertical rock wall of the buttress and just before it turns north to form the side wall of Eagle Creek. A sixth-class route to this ledge had previously been made by Gerry Czamanske and me. (*SCB*, October, 1959.) The route reported here is 150 yards to the left of the previous one and just left of the head of a brook that runs in the spring and early summer. It is to the right of a large tree-capped buttress that lies against the large El Capitan buttress.

While ascending steep, third-class rock to the left of the vertical face, we kept under an overhanging cleft in the rock that curves gently to the right. The climb starts below a small tree and continues up and to the right. A short vertical section requiring two direct-aid pitons brought us to a belay bolt on the rock one lead below the cleft. Two sixth-class pitches lead to the top of the cleft and a belay from slings under the roof that caps it. The roof is passed on the right, the route returning to the left and up a bolt ladder, gently overhanging in one place, to a ledge from which the main ledge to the summit can be gained by scrambling. Eight bolts were used although two or three of them would not be necessary if stoveleg pitons were available.

HENRY KENDALL

SLAB-HAPPY PINNACLE

This "pinnacle" is a 400-foot, pointed slab leaning against the east face of the east buttress of El Capitan. Some 100 feet below and to the right of the apex of the slab is a subsidiary pinnacle which was named "Sub-Pin." There appear to be three possibilities for routes on Slab-Happy: the right and left sides and the east face.

On May 20, 1961, Tom Frost and I made the first ascent of this formation. Our route involved moderate sixth-class and very difficult fifth-class climbing up the corner on the right side of Slab-Happy to a point 50 feet below the top of Sub-Pin. Here we traversed to the face on the left and ascended it to a belay spot just below the top of Sub-Pin. We then traversed left and up a very strenuous lie-back to the top of the pinnacle. This route was named the "Diehardral." Climbing time was five hours and we placed 25 pitons.

A week later, May 27, Harry Daley joined Tom and me to make the first ascent of the east face. The first pitch follows a thin crack near the left margin of the face for 50 feet and then traverses downward to the right for 50 feet to another thin crack. Two bolts protect this delicate traverse, and a third bolt provides access to the second thin crack. This crack widens to a jam crack which is followed until it joins the Diehardral route, just below Sub-Pin. Climbing time was about seven hours and 38 pitons were used, but were placed double in six cases. Several rurps and several knife-blades were used on the first pitch, and large angles were required above.

Both routes on Slab-Happy provide challenging and engaging problems for advanced climbers, but probably would not be enjoyed by intermediates.

ROYAL ROBBINS

THE ROYAL ARCHES DIRECT

The problem of climbing directly up the Royal Arches has for years been an intriguing challenge to many California climbers. Early in June, 1960, Richard Calderwood and Jerry Dixon climbed up the middle of the generally smooth face below the main group of arches to the 100-foot overhang of the bottom arch. However, a lack of any weakness in the rock above them prevented further progress.

Having surveyed the problem, Joe Fitschen and I decided a possibility for a direct ascent lay several hundred feet left of the line taken by Calderwood. It appeared that the upper section—the last 250 feet—might be climbed by following two parallel, grass-filled cracks near the west side of the true Arches. Reaching these cracks by following a fracture pattern up and over the lower arches appeared to be the crux of the climb.

On June 24, 1960, Joe and I, hoping to establish what we thought would be an enjoyable, classic, two-day, sixth-class route, began climbing in the corner framed by the smooth face and the onionskin-type formations at the left side of the main group of arches. We swung leads for six or seven long pitches, curving diagonally upward to the right, and in mid-afternoon arrived at a pine tree at the base of a large overhang. About one-fourth of the climbing to this point was sixth class, and some of the pitches were very difficult and required careful judgment and delicate technique. However, the challenge they offered paled in comparison to the slimy, grassy, and rotten overhang which then faced us. Further, the situation was worsened by water diffusely dripping down over the route.

It was my turn to lead and after five hours of chopping grass and dirt, and fifty feet of progress via many shaking pitons placed in moist, rotten rock, it was clear that this pitch was the most formidable direct-aid problem I had ever encountered. Pitons were *very* difficult to place, and sometimes six inches of grass and mud had to be cleared away to lay bare the rock. After placing a sound piton I took a calculated risk and climbed free for 25 feet. Then, standing in delicate balance, I placed a knife-blade piton behind a small flake. After a couple of minutes this flake broke off, causing me to lose my balance and fall 50 feet. The rope at this time was running through a dozen carabiners and this created considerable friction which kept the

dynamic element in Joe's belay small. However, in spite of an almost static belay and a single loop of rope around my waist, I was not even bruised in this fall. The lateness of the hour prompted us to give up our efforts for that day.

Our sleep that night was interrupted occasionally by the dripping water being blown over us, and by anxious thoughts of the difficulties awaiting us the next day.

In the morning, after another, shorter fall in the same area as that of the previous day, I placed direct-aid pitons across the troublesome section and then up the next 50-foot headwall. After five hours of strenuous and frustratingly slow climbing, I reached the second pine tree, 140 feet above Joe. Altogether, we spent over ten hours on this pitch and placed 28 pitons. The rest of the climbing that day was all direct aid and mostly very difficult, often making demands upon our determination and ingenuity. We spent the night in semi-comfort about 350 feet below the top.

On the third day 100 feet of delicate sixth-class climbing brought us to a sharp overhang. We placed four bolts to reach this point. We then climbed around the left side of the roof and thereby reached the two parallel cracks leading over the top. We followed the right-hand crack for two pitches and then switched to the one on the left, where one more easy sixth-class pitch ended the climbing. Most of the belays that day had been in slings.

The climb, which we had considerably underestimated, had taken three full days, and contained the most challenging sixth-class pitch either of us had ever seen. About 150 pitons were used and five bolts were placed. Considerable "gardening" was necessary on the entire climb, resulting on dirt-filled mouths and throats, and causing much gagging and dry-retching. This aspect, together with the intense heat and severe climbing, make this one of the most formidable routes in Yosemite.

ROYAL ROBBINS

THE NORTH FACE OF LOWER CATHEDRAL ROCK

After the north wall of Middle Cathedral Rock was climbed in 1959, the outstanding challenge remaining in the Cathedral Rocks group was the still virgin north face of Lower Cathedral Rock. This 1500-foot face is apparently vertical, bulges with overhangs, and lacks any continuous natural weakness up which to place a route. However, there is a 300-foot chimney starting 800 feet up and leading to the final overhangs. Unfortunately, this chimney appeared attainable only by placing a number of bolts across a blank area just below it. Nevertheless, Joe Fitschen, Chuck Pratt and I decided to attempt the climb and to try to reach the chimney, which appeared to be the key to the upper section.

On June 2, 1960, prepared to spend three days on the wall, we started climbing beneath a series of large, white overhangs lying somewhat to the right of the center of the face. Two pitches, the first involving an 80-foot traverse to the right, brought us to a 25-foot-tall Douglas fir growing just below the overhangs. The overhangs were passed in three pitches which involved a 100-foot traverse to the right and an 80-foot traverse back to the left. These three pitches, mostly sixth-class, required about seven hours to complete. One more pitch led to a comfortable bivouac spot among some bushes and ledges 400 feet up. Our progress that day was discouraging, as it had been frustratingly slow and circuitous. Another party might find a better line up this first section.

The second day an easy pitch and a 60-foot traverse left brought us to the hardest direct-aid problem on the climb. This pitch, competently led by Chuck, involved the placing of six successive knife-blade-type pitons in a very meager crack. One of these pulled out as I followed the pitch, and three came out under Joe's

weight. The upper section of this pitch contains some delicate climbing up a messy, dirt-filled crack. Several hours later we were at a ledge 60 feet from the bottom of the 300-foot chimney. After 30 feet of climbing up a jumble of very loose rocks, we found an overhanging crack which led through the rock for 30 feet to the desired chimney. We discovered that the chimney lies entirely behind a tremendous flake 40 feet wide and varying from three to ten feet in thickness. But we were disquieted to note that the flake seemed to vibrate when struck with the heel of the hand. The last 100 feet of this chimney narrows and becomes an extremely strenuous jam crack. We passed that night on a barely adequate ledge 100 feet above the chimney. The summit was now 300 feet above us and the largest ceilings on the face were directly above us.

On the third morning we climbed straight up for 100 feet and then diagonalled off to the right between two of the larger overhanging roofs. The climbing here was difficult and involved careful maneuvering through loose and rotten rock. The last problem was a delicate lieback up a thin flake, with an awkward mantle at the top. We reached the summit about noon. No bolts were placed.

This climb is at least the equal of the northwest face of Half Dome, but is not as beautiful and enjoyable as is Half Dome. The combination of poor piton cracks, rotten and very loose rock, dirty and messy gullys and cracks, and dangerous climbing problems, plus other disagreeable aspects has prompted us to consider this the most unpleasant, yet one of the most challenging climbs we have ever done.

ROYAL ROBBINS

THE NORTHWEST FACE OF THE HIGHER CATHEDRAL SPIRE

I first felt the lure of the northwest face of the Higher Spire over ten years ago when I hiked past it to the standard route. In September of 1960, Joe Fitschen and I finally got around to attempting the impressive 1,000-foot face, which is broken only by one somewhat irregular crack system running steeply upward to the right. We were stopped at the 600-foot level by a crack too wide for any of our pitons. The climbing to this point had been almost entirely difficult and fatiguing sixth class, and most of the pitons were placed under arching overhangs. However, there was an exceptional fifth-class section involving a 60-foot, overhanging, flared, and poorly-protected chimney. This chimney, which we named "The Chimney of Horrors," is not only frightening, but also technically difficult. Two nights were spent on the rock and we finished rappelling early on the third morning.

On the second attempt, the climbing team consisted of Tom Frost and me. This adventure started on the weekend prior to Memorial Day, 1961. By using "Bong-Bongs" (large angle pitons), Tom reached a high point 50 feet above the previous one. Unfortunately, the next pitch had an obviously blank section, and since we had forgotten our bolt kit we turned back at the 650-foot level, feeling very frustrated. We spent one night on the face this time, during which we sat through a light, but steady six-hour rain. What was most disheartening though was that we would again have to negotiate the Chimney of Horrors on our next attempt.

However, we came back a week later, June 6, and in the first day of climbing reached a ledge 550 feet above the ground. We were aided in this good start by fixed ropes on the first two pitches which had been placed the previous day by Steve Roper and me. On the second day, the pitch above our previous high point turned out to be a remarkable problem in direct-aid climbing and the crux of the ascent. Including belay anchors at the end of this pitch, 36 pitons and four bolts were

placed in five hours of climbing. Of the pitons, eight were knife-blade type and six were super-knife-blade "Rurps." A 152-foot rope is just barely sufficient for this pitch.

Above, a prominent right-angle gully leads to a large overhanging roof which we passed on the right in one pitch which brought us to Third Base. We ascended the summit block via the northwest corner, rappelling off the spire after dark.

Statistics: Eleven pitches, 180 pitons, and six bolts. Of the bolts, four were used for direct aid, one for protection in the Chimney of Horrors, and one for a rappel-belay anchor.

In our opinion, this climb is roughly the peer of the northwest face of Half Dome.

ROYAL ROBBINS

NEVADA FALLS — NORTHSIDE

About 200 feet north of Nevada Falls there is a long straight crack running up a shallow recess in the cliff, and topped by an overhang. This crack appeared to offer a short, enjoyable, and interesting sixth-class climb. On July 12, 1960, Lin Ephraim and I hiked up Little Yosemite Canyon to see if this were so.

Lin led the first fifth-class pitch up to the long crack which turned out to be very meager and inhospitable. After an hour of nearly fruitless effort, we gave up that line and climbed up and around to the right, eventually making a tension traverse to a small Douglas fir. The next pitch, the third, was the crux, and required the awkward placing of direct-aid pitons in poor cracks. I belayed in slings at the end of this pitch and Lin competently led the next one, which was also difficult but shorter than the third. The last pitch was a fun-type, fifth-class gully which brought us out on top about ten feet from the water.

This route is roughly comparable to the Lost Arrow Spire, perhaps a bit more difficult. Because of wind-blown spray from the falls, it appears inadvisable to attempt this climb before the middle of July.

ROYAL ROBBINS

MERRY OLD LEDGE

In April, 1959, Warren Harding and I spent two days making the first ascent of Merry Old Ledge. An earlier attempt by Harding and Wayne Merry had pushed the route halfway to the summit, which lies several hundred yards to the west and above Rixon's Pinnacle. The route diagonals up and eastward across a rib to the prominent pine tree somewhat below the halfway point, and then proceeds indirectly upward to the tree between the summit blocks which cap the rib.

The climb starts with a mantelshelf up to a very narrow ledge which flaws the otherwise smooth face just west of the rib. Climbing eastward and up, one reaches a short but very difficult friction traverse which is protected by a bolt. Beyond, an open fifth- and sixth-class crack leads up to the prominent pine. A "verticle bush-whack" and a bit of fifth lead on to a pleasant, spacious ledge and an oak tree. The ledge is exited at its northwest corner by a pitch which puts one in position to attempt the great flaring chimney above. This chimney was climbed sixth by placing extra-wide angles, in the crack. The crack was not followed to the top. Instead, Warren led up and around the left lip to a point 20 to 30 feet from the top and up to a belay tree. A tight fifth-class chimney began the next lead, but shortly we were forced to climb to the east via sixth class. Piton placement was difficult and finally when the horizontal crack stopped short of an open vertical crack system a pendulum was made to the east. Climbing up a short distance, Warren reached a small belay ledge on the east corner of the rib. A bolt placed here allowed a pendu-

lum back to the west into the vertical crack system. Sixth-class climbing of the "back-to-back" piton variety was followed by fifth, leading to the final belay at the tree in the summit notch. We scrambled onto the large, perfectly flat summit just as the sun was setting.

We used 70–75 pitons in climbing the 670 feet to the summit; more than three-fourths of these were for direct aid. In descending, a bolt was placed for a rappel from the ledge to the east of the climbing route, one rappel above the oak tree ledge. We left the rock for the night between two full days of climbing. This climb is difficult and strenuous but could perhaps be done in a long day by a fast party.

GERALD K. CZAMANSKE

THE NORTHWEST FACE OF HALF DOME

Attracted by the accounts that Royal Robbins, Mike Sherrick and Jerry Galwas gave of their first ascent of the northwest face of Half Dome, Chuck Pratt, Tom Frost and I chose June 13, 1960, as a good day to start the second ascent of this fine wall.

We had prepared for a four-day ascent but by noon of the first day we had reached the ledge where the first party had spent their first night, indicating possibly three days on the rock. At the end of our first day we had crossed the "Robbins Traverse" (*SCB*, November, 1958), were halfway up the face, and had a fixed rope established on the first pitch of the flake system. The following day took us within 200 feet of the summit where darkness necessitated a rather uncomfortable bivouac on the "Thank God Ledge." However, two hours of climbing brought us to the top on the third morning and we were able to return to the valley floor in time to watch people who were supposedly watching us.

A week later Royal Robbins and Dave Rearick made the ascent in two days. We used a few over 100 pitons on the climb and were surprised to find that six of the 25 pitches were fourth class and that only four of the pitches required extensive nailing (12 to 19 pitons and bolts). Nevertheless, the climb still remains one of the great classic routes in this country, and one of the most enjoyable for us as well as one of the most challenging.

JOE FITSCHEN

SKI JUMP

Southeast of the Cathedral Spires is an 800-foot buttress. Because of its curved, sweeping face, climbers in Yosemite Valley have referred to it as the "Ski Jump" even before it had been climbed.

In July of 1959 Bob Kamps and I started the ascent of the Ski Jump. We expected to find difficult fifth- and sixth-class climbing in the huge open book crack on the left side of the curving face. Instead, we discovered ten pitches of very enjoyable fourth- and fifth-class climbing in the center of the face. The climb required all varieties of climbing technique. There are four pitches of fourth class and several moderate-to-difficult fifth-class pitches on the lower and middle portions of the face. The final two pitches are in a narrow and somewhat rotten closed chimney. This chimney splits the entire buttress from front to rear and leads directly onto a ledge below the summit block. We made our descent by rappelling down Harris' Hangover.

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More Books from the Sierra Club

For the convenience of members, the Sierra Club office carries a few books by other publishers which pertain particularly to the club's fields.

A Sand County Almanac, by Aldo Leopold (Oxford, $4). As the author writes in his foreword, "There are two kinds of people; those who can live without wild things and those who cannot. These essays are the experiences and dilemmas of one who cannot."

My Wilderness—The Pacific West, by William O. Douglas (Doubleday, $4.95). Justice Douglas takes us on an intriguing walking trip through magnificent areas of unspoiled beauty from the Sierra to the Olympics.

Listening Point, by Sigurd F. Olson (Knopf, $4.50). Everyone has a listening point somewhere, some quiet place where he can contemplate the awesome universe. This book is the story of what such a place has meant to the author.

Mountaineering: The Freedom of the Hills, edited by Harvey Manning (The Mountaineers, $7.50). The hope behind this book is that it will allow students to more quickly and safely become, on whatever level they choose, wilderness mountaineers.

This Is Dinosaur: Echo Park Country and Its Magic Rivers, edited by Wallace Stegner. The great controversy over the proposed Echo Park dam has brought wide recognition to Dinosaur National Monument. *This Is Dinosaur* will let you see why there has been furore. The book puts you there, through the ages; it gives the place meaning and perspective. (Knopf, $5.)

The National Parks: What They Mean to You and Me, by Freeman Tilden ($1); *The Sierra Nevada: The Range of Light* (various authors, $6); *Exploring Our National Parks and Monuments* ($3.95); and *Seeing America's Wildlife in Our National Refuges* ($2.50), both by Devereux Butcher; *Death Valley,* by Ansel Adams, Nancy Newhall, and Ruth Kirk ($2.50); *Yosemite Valley,* by Ansel Adams ($2.95) —all these add greatly to an understanding of the natural scene.

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